The
# CHEMICAL AGE

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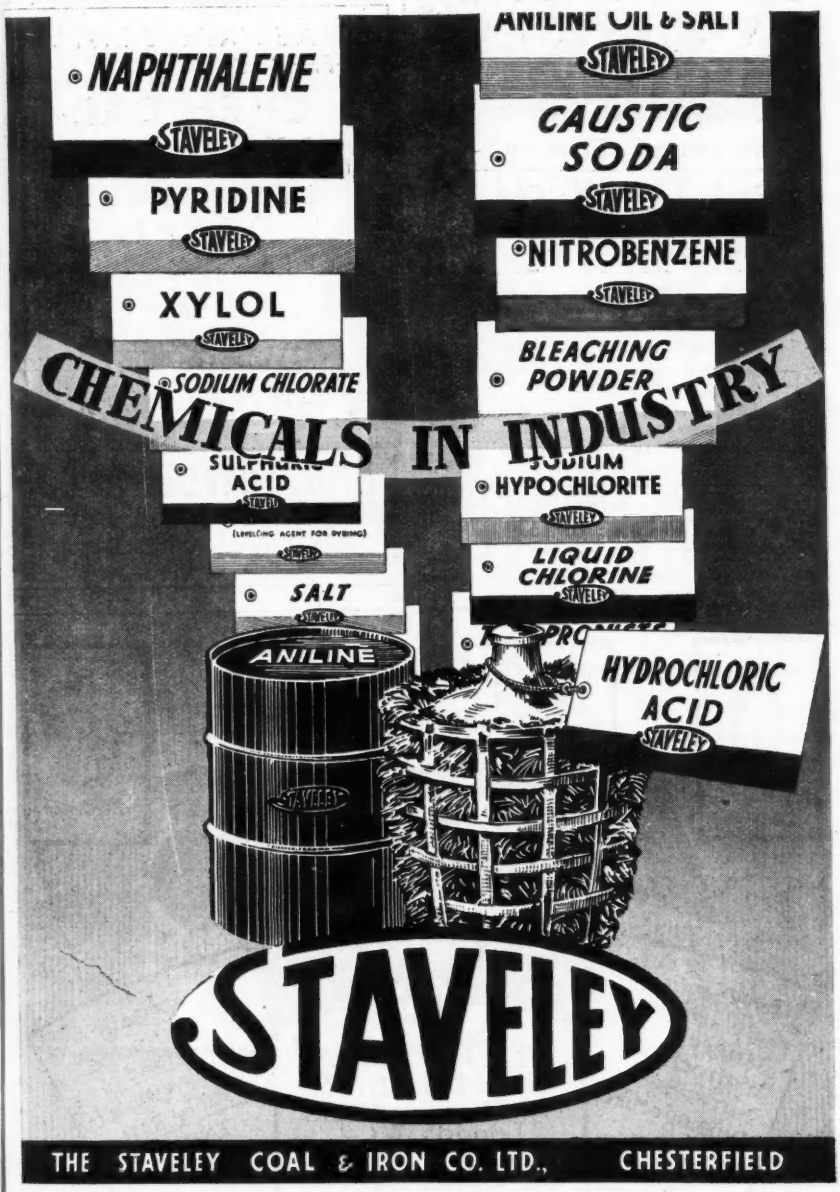
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# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

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## A Sound Investment

NO scientist to-day requires to be persuaded of the fundamental importance—fundamental to the very existence of the civilised way of life—of organic chemistry. That very obvious fact is, nevertheless, not very widely recognised and the reminder lately provided by Sir Robert Robinson, speaking as one of the two Nobel prizewinners honoured by the Federation of British Industries, was timely. Organic chemistry affects the ordinary human being in almost everything he does; his clothes may be built up of synthetic fibres; his food owes much of its quality and quantity to the work of the organic chemist; the organic chemist has much to say in agriculture. The dyestuffs that lighten the drab pattern of our lives are the work of the organic chemist. If we are ill, it is to the discoveries of the biochemist and the organic chemist working on the discovery and production of drugs that the doctors rely. Sir Robert Robinson rightly likened the world to a colour print in which the colours were blended of several different primaries; take away the one that corresponds to organic chemistry and, while the general pattern would still be discernible, its colour would be very different and there would be many voids to be filled.

Among the many questions that nature has posed are some which are susceptible to intensive attack from many angles resulting ultimately in solution. Very different are the investigations in organic chemistry. As new discoveries are made new vistas are opened and new opportunities for extension of knowledge become evident—the farther we go the wider the horizon unexplored. All the work of organic chemists has broadened the basis of our operations.

These considerations have a very important industrial bearing. Sir Robert Robinson pointed to the relative scarcity, or at least limitation, in our supplies of carbon and he urged that this limitation makes it all the more necessary that we should use our reserves of coal and oil intelligently. A major unsolved problem is the use of what might be termed second-grade vegetation, such as trees not fit for timber. One recalls that a chemist at the recent World Power Conference gave examples of valuable practical and large-scale work which had been done on the Continent on the production of fuels from these materials by fermentation. In many parts of the Empire the solution of this problem would bring valuable industrial and social benefits. It follows that this country, which will depend so much for its future prosperity upon keeping in the van of progress, must extend its work into the research and development of organic chemistry by every means in its power.

It is singularly unfortunate that the necessity for expansion and the obvious opportunity to be gained by expansion, have become evident at a time when, through Government White Papers, we are made acutely aware of the difficulty of providing labour and materials for even the elementary needs of daily life. When this country was rich, 40 years ago, we could have afforded to have equipped great

## On Other Pages



laboratories for the study of fundamental problems and of industrial developments of scientific discoveries. At that time, however, industrialists were not persuaded of the value of science. Many of the more far-reaching discoveries of science were yet to be made and scientific workers were few. Above all, there was abroad in this country an evil spirit which persuaded industrialists that it was better to let the foreigner lose his money in developing new processes—to "wait and see." When we had the means to give scientific workers full equipment we were not convinced of the utility of doing so. Is it now too late? Can the Government and the nation be persuaded that as a long-term policy it is better to spend money on scientific and technical development than on vast social schemes which attract the voter but leave him unarmed?

The growth of organic chemical industry depends almost entirely on new products and new processes. Sir William Larke, speaking at the same meeting, emphasised "the debt which industry now recognises is owed to science." Sir Robert Robinson, referring to some of his industrial contacts in a consultative capacity, stated that it was these contacts which kept him alive in the scientific sense. There is thus clear evidence, if evidence were wanted at this stage, that continuous collaboration and contact between industry and the pure scientist is valuable and stimulating to both. One consequence of this should be the production of more university scientists. Sir Robert Robinson pointed out that the extent of the schools for teaching organic chemistry was inadequate; his own department required to be expanded to 2½ times its size. Teachers should be more highly remunerated. Might it not be possible for industry directly to endow schools of organic chemistry? There have been many examples of this in other fields in the past and especially in the U.S.A. A most fruitful step towards the improvement of status and the calibre of teachers would be arrangements whereby teaching departments in our universities were retained at a fee as consultants by industry, the fees being divided among the staff.

Valuable as is the work of the DSIR in setting up research associations, we are convinced that a more direct contact between industry and the teaching profession should be established and would be of advantage to both. Sir Robert Robinson showed how development on the practical plane—medical, industrial, agricultural, and so on—of new discoveries had been immensely accelerated through work done in pure science often many years previously. It is not impossible that a case can be made out for the direct financing of universities by industry, perhaps through a levy collected by the Treasury. That would be an infinitely better use for a portion of the national income than many of the projects that have been put before Parliament in recent years.

# NOTES AND COMMENTS

## The Budget

FEW Budgets in recent years have made less direct reference to industry than that presented by Sir Stafford Cripps on Tuesday. Industry, having in mind the effect of much of the recent policy of the Government in industrial affairs, may have noted the apparent omission with satisfaction, regardless of the many departments in which some present relief would have rendered possible substantial future increases in productivity. Such increases, it need hardly be said, remain the only means of permanently solving the problem of national overspending which, as the Chancellor recalled, threatens to exhaust all the present reserves in 1949 and disastrously to curtail imports. Final judgment of the Budget must depend to a large degree on the extent of the response to the reliefs provided as incentive to greater effort by wage earners, which has resulted in a very considerable proportion of the £100 million tax reduction. There are, unfortunately, no sure grounds for assurance that reduction of tax on the reward of voluntary additional effort of various kinds will produce the industrious spirit which is indispensable. Nothing in the Budget offers any hopeful prospect of effectively discouraging the continuing inflationary tendency, whose roots are firmly embedded in the wider groups, who will now have rather larger sums to dispose of. The "Capital levy on investment incomes," it is very certain, will contribute nothing towards the solution of that problem, gratifying as the levy may be to Party politicians.

## The Monopolies Bill

WHAT constitutes a monopoly? When is a monopoly "not in the public interest"? These are but two of a cloud of queries which the Government seems intent on raising as an inevitable consequence of its introduction of the Monopoly (Inquiry and Control) Bill. It is true that the draft of this Bill lately presented in the House purports to identify a monopoly; according to this a monopoly exists if one-third or more of a type of goods "are supplied by or to any one person or by or to any such two or more persons . . . who, whether voluntarily or not, so conduct their affairs as in any way to prevent or restrict competition. . . ." The duty of providing an answer to the second question, which rests on even more controversial ground, will be the unenviable task of a Monopoly Commission of not more than eight individuals under the direction of the Board of Trade. The subject of monopolies could reasonably be regarded as one on which the Government just now might prefer not to focus attention. But the commandment in this connection, it appears, is not "Thou shalt not monopolise," but "Thou shalt have no monopolies but the State's." That may be taken as being the general principle; translating the commandment into action is, however, likely to present some problems which the Commissioners may be thankful not to have to solve. Many specialised sections of the heavy chemical and pharmaceutical industries come within the jurisdiction of the "one-third" clause. Generally, these are "monopolies" only because it is in nobody's interest to share with them those specialised and exacting functions. Most of these "giants" will in fact turn out to have been indispensable windmills.

## Steel and Chemicals

THE foregoing description, unromantic as the facts so often are, must wear a drab appearance beside the spirited, if—as we think—uninformed view presented in "Public Ownership—the Next Step." This colourful presentation of the case for more nationalisation now derives some claim to attention from the fact that it represents the view of the Labour Party and presumably of some of the sponsors of the Bill. This publication, unlike the effort by the Parliamentary draftsmen, is not in the least tentative. It purports to show why Government ownership should be extended to many more industries and mentions that "certain raw materials and services flow into a wide variety of industries. Coal, steel and chemicals are obvious examples of materials; transport, gas and electricity of services . . . ." The fact that of the six industries mentioned four are now State

monopolies is worth noting. "Trust-busting," says this Labour Party pamphlet, is not enough. "Monopoly is often technically necessary, and therefore more efficient than competition. . . . Where monopoly is more efficient Socialists believe monopoly should be public so that private power is eliminated while efficiency is preserved." The pamphlet might have added (but did not) that "private power" in Imperial Chemical Industries, Ltd., is wielded by more than 146,000 Ordinary shareholders, of whom 96,000 hold less than £200 each.

## Bribery and Corruption

IN a copy of a news-sheet recently received it is interesting to observe that the chemical industry is actively interested in the stamping out of one of the greatest menaces of the present-day—corrupt practices of many kinds. We refer to the "News Sheet" of the Bribery and Secret Commissions Prevention League, Inc., two of whose five vice-presidents are Lord McGowan and Viscount Leverhulme. In the chemical and allied industries evidence of racketing and anti-social activities of the same order is happily absent, and the credit for this gains force from the undoubted existence of great temptations offered by the continued Government control of materials. Support for the "News Sheet" in the form of advertising seems as scanty as the support for its aims, which probably accounts for the fact that despite its maturity—its inception dates from 1907—it remains one of those publications which few people see, other than those who are already fully aware of the need for concerted action of a kind which might dispel the over-tolerant outlook in which underhand transactions flourish. The trend of current affairs to which this anti-bribery publication bears witness, has conferred on organisations of this kind added importance and responsibility. There is evidently a great deal of "cleaning up" to be done and the task calls more urgently than ever for active participation from all quarters.

## SCOTTISH SCIENTIFIC RESEARCH

"SCOTLAND has been pouring away her scientists and engineers without fully realising what she was doing," declared Mr. W. R. Robertson, technical secretary of the Scottish Council (Development and Industry), when he outlined the future aims of the council at a recent conference in Glasgow. "It is my belief that the industrial changes we will see in the next 50 years will be as great, or greater, than the changes which have taken place during the past 100 years," he added. "There will be changes in materials, processes, and sources of power."

The council hoped to increase the application of scientific research in Scotland and intended to see that a greater share of Government research and development contracts came north of the Border.

A six-point plan for giving help to Scottish industry was outlined by Sir Steven Bilsland, president of the council, when he emphasised the need for financial support. He said the council intended to develop existing industries, promote new work, and to develop the economic utilisation of Scotland's natural resources.

An appeal for £25,000 is now being made to support the project of a Scottish Trade Fair, probably in Glasgow, next summer, to show new industrial development during the last five years and the ramifications of Scottish industry as a whole.

## Chemical Society Grants

The council of the Chemical Society has announced that grants will be awarded from the Research Fund in June next. Applications for grants, to be made on forms obtainable from the general secretary, Burlington House, Piccadilly, London, N.W.1, must be received on or before May 10. Applications from Fellows will receive prior consideration.

Attention is drawn to the fact that the income arising from the donation of the Worshipful Company of Goldsmiths is principally devoted to the encouragement of research in inorganic and metallurgical chemistry and that the income from the Perkin Memorial Fund is to be applied to investigations relating to problems connected with the coal tar and allied industries.

**Cattle-feed From Seaweed.**—Plans for increased production of animal feeding stuffs have been completed at Oban by a new company which opened a seaweed factory there last year. The company plans to expand production of cattle and poultry feeding stuffs from seaweed. Similar work is already being undertaken by the Scottish Seaweed Research Association.

# Detergents, Wetting and Emulsifying Agents

## Practical Studies at SCI Symposium

*From a Special Correspondent*

OVER 200 members of the Society of Chemical Industry attended a symposium arranged by the London Section on Monday and Tuesday of this week. The symposium was held in the mathematics lecture theatre of the Royal College of Science and the programme for each day was divided into afternoon and evening sessions. This was a highly commendable idea as it enabled members who were prevented from attending the afternoon sessions to hear at least some of the many interesting papers given.

The symposium was opened by Prof. E. K. Rideal, who briefly outlined some of the more important fundamental considerations of surface chemistry which are applicable to the problems of detergency.

It was pointed out that before discussing the various types of detergents and their methods of use it was wise to give some thought to the kind of dirt involved. This may be broadly divided into two main groups, either particulate dirt which is largely inorganic, and organic dirt which may be subdivided into the fat and wax type of polymerised material produced by the oxidation of fatty acids. Professor Rideal proceeded to show how studies of films of chloresterol, taken as typical of the fat and wax type of dirt, shed some light on the mechanism of detergency.

### Laundry Practice

The second paper was presented jointly by F. Courtney Harwood and Dr. J. Powney, both of the British Launderers' Research Association. At the outset of their paper these authors defined a detergent as a substance which facilitates the removal of dirt from soiled material and went on to outline the essential stages in a normal laundry washing process, which were then considered from the physico-chemical point of view.

Among the more important of these stages are the efficient penetration or wetting-out of the fabric in order to establish intimate contact between the dirt and the detergent liquor, the displacement of the dirt from the fabric and its removal in a suitable form to prevent redeposition, and finally the drying and finishing of the article.

The soiled capillaries of the article to be washed are usually hydrophobic and mechanical agitation is essential to displace air; in addition, uneven soiling was also prone to cause different rates of penetration which would also give rise to air pockets. The authors mentioned that it was inadvisable to give articles a pre-wash with dilute alkali, since the detergent had then to remove the inert water before it could begin to function effectively.

Details were given of the laundry use of fatty acid soaps, mention also being made of some of the newer synthetic materials. Among these were the alkyl pyridinium halides which are useful for hospital work as their bactericidal action prevented cross infection; and cetyl tri ethyl ammonium bromide, which is a useful addition to the last rinse of articles which must be washed at low temperatures (*i.e.*, less than 150° F.).

Of the commercially available materials, soap still remains supreme but even so the normal laundry washing process has a very low efficiency, 1 h.p. hour being required for the removal of 8-16 oz. of dirt. Experiments are now being made using ultrasonic vibrations and although it is too early to draw conclusions from the results of these experiments, this new technique may revolutionise present procedure.

### Laboratory Tests Inadequate

The final paper in the afternoon session was given by J. W. Sawtell (Thomas Hedley and Co., Ltd.). In this the author described the different tests which have to be carried out to evaluate a new detergent and pointed out that, contrary to usual experience, the results obtained from laboratory tests are usually less accurate than large-scale trials.

One of the main difficulties in any laboratory test was the preparation of a standard soil and the fact that the same type of soil will not give correct results for fabrics of different kinds. Of the large-scale methods described a wash-wear test was, in the author's opinion, of the most value, even though it depended for its judgment on the human element.

In the evening session were presented two papers, the first by Dr. W. D. Scott and Dr. D. S. P. Roebuck (Monsanto Chemicals, Ltd.) on the relation between chemical structure and performance. As mentioned in the previous paper, a detergent may be evaluated by large-scale trials seeking to simulate service conditions, or by measure-

(*Continued overleaf*)

**DETERGENTS**—*(Continued from previous page)*

ments of simple functions. In order to co-ordinate the chemical structure with performance it was necessary to study the relationship of the simpler functions concerned in detergent action with particular groups of compounds. Such simpler functions are wetting and penetration, destruction of adhesive forces between surface and soil, colloidal nature of detergent solutions and colloidal structure in a non-aqueous medium. Examples of typical hydrophilic groups were given, *e.g.*, sodium sulphates, sulphonates and carboxylates and the relative merits of these were considered in connection with their sensitivity to calcium and magnesium ions and their solubilising power.

The latter is a broad term indicating the molecular weight of the hydrocarbon residue which, in combination with the hydrophilic group, gives optimum surface activity with respect to a homologous series of hydrocarbon residues. It is the repulsion between the hydrophobic portion and the water which drives the hydrophilic portion of the detergent into the material. By consideration of the diphenyl sulphonates the authors further illustrated the effect of various substituents in the molecule.

The final paper in the first day's session was by F. H. Braybrook (Shell Petroleum Company) who traced the rise in the use of synthetic detergents from the time when they were manufactured as speciality products for the textile industry to the present. Vast increases in output of synthetic detergents had occurred during the war years, notably in the United States where the necessary raw materials were available from the petroleum industry. It was suggested that owing to a general rise in the world standard of living, with consequent use of fats for nutrition, the present high rates of production of synthetic materials would continue.

Details of the second day's papers will appear next week

## COAL AND OIL RESERVES

MR. L. S. DAWSON, general manager of the Oil Well Engineering Company, speaking at Manchester recently, said that the coal industry was likely to remain the basis of our prosperity. Coal reserves would last for another 2500 to 5000 years, while at the present rate of production the estimated oil reserves would last only 25 years. Nevertheless, it was likely that with deeper drilling gear more extensive reserves would be discovered. While consumption outstripped production in the United States, the situation was reversed in the Middle East, where Britain controlled all the pipelines and 60 per cent of the wells, as against the United States' control of 33 per cent of the wells and 80 per cent of the refineries.

## Verdict on Texas Disaster

### Neglected Ventilation in Nitrate Ship

FOUR chemists of the U.S. Army Ordnance Department at Picatinny Arsenal, New Jersey, have just completed a study of the Texas City, Texas, ammonium nitrate explosion a year ago which resulted in 433 dead and 128 missing. They report that similar nitrate explosions can be avoided by the simple expedient of assuring a supply of fresh air in storage areas.

The four chemists stated that gases trapped in the hold of the *Grandcamp*, on which the blast originated, which were released by the fire that preceded the blast, exploded and touched off the cargo of nitrate. The explosion jumped from the *Grandcamp* to the *High Flyer*, which was also loaded with fertiliser-type ammonium nitrate, and then to Texas City's chemical works.

If the ship's hatches had been opened, the gases from the fire would not have exploded, the Army's chemists state, and there would have been no disaster.

Meanwhile, in the House of Representatives, Mr. Clark W. Thompson, Democrat of Texas, assailed France's failure to waive all immunity in legal action arising from the Texas City explosion. The French have agreed, he said, to accept liability up to the value of the French ship. Inasmuch as the ship was destroyed, he argued, this is no concession, and the Justice Department is contesting the French position.

## AMMONIUM NITRATE EXCLUDED

THE American steamer, *Richard Upjohn* (7198 tons), diverted from Boulogne to Antwerp with a cargo of ammonium nitrate last week, was not allowed to enter the port. The vessel was anchored in the Scheldt estuary, where the cargo was discharged into barges. The French Government last August decided to allow no more nitrate ships to dock in French ports, after the Norwegian ship, *Ocean Liberty*, blew up at Brest, killing 21 people and causing £2 million damage.

## Chemical Wages Bill

The National Income White Paper published on Monday shows that of the national wage bill total for 1947 of £3530 million, chemicals and allied industries accounted for £68 million, and metal and metal goods £232 million. The corresponding figures for 196 (total wage bill was £3095 million) were £62 million and £199 million respectively.

# Chemicals in January

## Higher Employment Totals

EMPLOYMENT figures for the chemical and allied industry, which in December (358,100) disclosed a drop of 100 compared with November, have now resumed their upward trend, according to the *Monthly Digest of Statistics* for March. The January total of 359,300—the highest since 1945—shows that the largest increase occurred in the recruitment of men to the explosives and chemicals section, new entrants totalling 1100, and accounting for all but 100 of the advance since December.

## More Fertilisers

Production in January appears to have remained relatively steady, although appreciable advances both on December, 1947, and January, 1947 (in the latter the advance was considerable) occurred in the output of fertilisers. Compound fertilisers at 142,500 tons compares with 137,800 tons in December, 1947, and contrasts strongly with the January, 1947, figure of 117,400 tons.

Consumption figures were almost invariably higher in January, 1948, than in either the December period or in the corresponding month 12 months ago. Agricultural lime consumption at 431,200 tons, although 14,000 tons less than in December, was an increase of 202,000 tons on January, 1947. Refined metals—with the exception of zinc concentrates—all registered appreciably higher consumption figures, reflecting increased momentum of export activity in metal goods.

# Poor Quality Fuel

## Increased Burden on Steel Producers

ATTENTION was drawn to the deterioration in the quality of coke by Mr. Robert James, chairman and managing director, at the 84th annual general meeting of the Barrow Haematite Steel Co., Ltd. The smelting properties of coke, he observed, were dependent on the carbon content. An increase in the amount of ash not only meant less carbon but every 2 per cent increase in the amount of ash required an extra 1 cwt. of coke to reduce that ash to slag, and an extra cwt. of coke cost 4s. Complaints of the deterioration in the quality of fuel, coal as well as coke, seemed almost universal, and he wondered whether the increase in coal production of which so much had been said, was not made up of non-combustible matter.

# U.K. RUBBER CONSUMPTION

RUBBER consumption in January, says the statistical bulletin of the Rubber Study Group, amounted to 18,284 tons, the highest aggregate since the October (1947) consumption of 17,104 tons. It is significant that French consumption during January at 8461 tons was an all-time record. World production and uses of natural rubber in January remained steady at 120,000 tons and 17,500 tons respectively. World stocks amounted to about 840,000 tons.

PRODUCTION AND USE IN JANUARY — FEBRUARY

| | January, 1948 Thousand Tons | | | January, 1947 Thousand Tons | | |
|---|---|---|---|---|---|---|
| | Production | Cousumption | Stocks | Production | Consumption | Stocks |
| Sulphuric acid ... ... ... ... | 123.5† | 134.0 | 59.5† | 117.6 | 118.0 | 65.3 |
| Sulphur ... ... ... ... ... | — | 21.7† | 93.3† | — | 12.8† | 71.1† |
| Pyrites ... ... ... ... ... | — | 19.3† | 62.0† | — | 13.8† | 71.0† |
| Spent oxide ... ... ... ... | — | 16.0† | 166.6† | — | 13.6† | 143.7† |
| Molasses ... ... ... ... ... | 34.06 | 34.7* | 224.9 | 54.43 | 37.0* | 143.5 |
| Industrial alcohol (mil. bulk gal.) ... | 2.26 | 3.30 | 7.35 | 2.33 | 2.71 | 2.40 |
| Superphosphate ... ... ... ... | 93.3 | 108.4 | 132.3 | 85.1 | 88.7 | 179.2 |
| Compound fertilisers ... ... ... | 142.5 | 157.4 | 240.4 | 117.4 | 126.2 | 284.2 |
| Agricultural lime ... ... ... ... | — | 431.2 | — | — | 229.9 | — |
| Ammonia‡ ... ... ... ... ... | — | 6.32† | 4.31 | — | 4.86† | 4.14† |
| Phosphate rock (agricultural) ... ... | — | 77.4 | 126.6 | — | 64.7 | 117.4 |
| Phosphate rock (industrial) ... ... | — | 6.54 | 48.7 | — | 4.11 | 34.1 |
| Virgin aluminium ... ... ... | 2.57 | 15.7 | — | 2.71 | 17.4 | — |
| Magnesium§ ... ... ... ... | 0.28 | 0.29 | — | 0.16 | 0.16 | — |
| Virgin copper ... ... ... ... | — | 37.2 | 99.2 | — | 33.5 | 81.7 |
| Virgin zinc ... ... ... ... ... | — | 22.0 | 35.2 | — | 19.7 | 36.1 |
| Refined lead ... ... ... ... ... | — | 18.9 | 39.4 | — | 17.6 | 21.3 |
| Tin ... ... ... ... ... ... | — | 2.60 | 14.9 | — | 3.14 | 19.4 |
| Zinc concentrates ... ... ... ... | — | 13.5 | 51.0 | — | 15.6 | 103.0 |
| Steel ingots and castings (including alloys) ... ... ... ... ... | 289.0‡ | — | — | 206.0‡ | — | — |
| Rubber: | | | | | | |
| Waste collected ... ... ... | 0.01 | 3.99 | 16.9 | 0.18 | 1.14 | 101.7 |
| Reclaimed ... ... ... ... | 0.42 | 0.49 | 4.0 | 0.45 | 0.48 | 5.21 |
| Natural ... ... ... ... ... | — | 3.95 | 129.8 | — | 5.44 | 174.4 |
| Synthetic ... ... ... ... ... | — | 0.05 | 2.23 | — | 0.08 | 3.19 |

* Distilling only. † February. ‡ Weekly average. § December (latest available figures).

## "Most Impressive"

### Sir A. Fleming's View of Penicillin Plants

SIR Alexander Fleming, discover of penicillin, paid his first visit, last week, to a British mass-production penicillin factory at Speke, Liverpool, operated by the Distillers Company (Biochemicals), Ltd., and saw how British chemists are trying to meet the great demand for the drug. As he drove to the factory he noticed that the road where the factory stands is named after him. After spending two hours inspecting the plant, which covers 12 acres and employs 500 people, he said: "It has been an interesting experience. I know nothing about this side of penicillin production and what I have seen to-day has been most impressive."

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Of particular interest to him was the pilot streptomycin plant now being built at the factory. When the pilot plant is in full operation, within a few months, the entire initial output will be used by the Medical Research Council.

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## PENICILLIN'S EXPORT VALUE

"PENICILLIN and the Export Gap" was the title of a staff talk given by Miss Ida Townsend, an executive director of Glaxo Laboratories, Ltd., Greenford, when she visited the company's penicillin plant at Barnard Castle on March 18. Miss Townsend, who controls the company's entire export business, told the workers there was no limit to the quantity of penicillin which could be sold, and explained that its values were threefold—it was a dollar earner, a dollar saver, and a life saver. Penicillin was on the essential imports list of every country—even the U.S.S.R. Miss Townsend, who joined the firm in 1919, was for many years export manager; her appointment as executive director dates from last year.

The company's agents in South and East Africa, and Southern Rhodesia have recently received visits from Sir Harry Jephcott, chairman and managing director, whose purpose has been to promote British trade with those countries.

Of interest to welfare and first-aid departments of chemical factories is a small (pocket sized) booklet which Glaxo Laboratories has just produced. It outlines a typical clinical picture of penicillin in action under the title of "Penicillin Routine," and contains brief information on why, where and when to use it.

## U.S.-Chinese Metal Union

### Reynolds Metals Backs Aluminium Project

A CONTRACT has been concluded between the Chinese National Government and the Reynolds Metals Company, U.S.A., to establish an aluminium industry on a partnership basis. This was revealed last week by Mr. J. Louis Reynolds, vice-president of the American company. It is believed to be the first occasion upon which the Chinese Government has granted American private interests equal partnership in a major Chinese industry. The agreement was negotiated in Nanking and Shanghai by Mr. Reynolds and Mr. Walter L. Rice, a vice-president of Reynolds Metals, and Dr. Wong Wen-Hao, chairman of the National Resources Commission.

#### Divided Control

Under the terms of the contract, the China Aluminum Company will be formed with control equally shared by the American company and the National Resources Commission. The Chinese company will take over the alumina plant and the aluminium reduction plants in Taiwan (Formosa) acquired by the Chinese Government upon the surrender of Japan. The mills will be rehabilitated and expanded to provide sufficient aluminium for the Chinese market and for exports to obtain dollar exchange. The chairman of the new company will be the chairman of the National Resources Commission and the president will be nominated by Reynolds Metals.

Mr. Reynolds said that in addition to the capital furnished by stockholders, it is planned to borrow extra funds from the U.S. Government which will be used to improve the plant and provide certain fabricating facilities to be installed adjacent to the alumina and aluminium mills. He added that production of small quantities of alumina and aluminium had already begun.

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## SOUTH AFRICAN MERGER

A MERGER by two of the largest British paint concerns, Lewis Berger & Sons (South Africa), Ltd., and A.E. & C.I. Paints, a subsidiary of African Explosives & Chemical Industries, Ltd., was announced last week. Mr. W. J. Darby, group managing director of Lewis Berger & Son, Ltd., said the agreement between the two companies would safeguard the South African market in the interests of Empire trade and the co-ordination of technical knowledge and experience of the two organisation would be unrivalled in the paint industry.

# FERTILISERS FOR THE COLONIES

## Need for Synthetic Nitrogen Production

AMONG commodities considered by the Colonial Primary Products Committee (set up in May, 1947, to review the possibility of increasing Colonial production) were fertilisers, and the part they play and could play in Colonial agriculture. The committee's findings are published in an interim report (HMSO, 6d.) Colonial No. 217, which, insofar as fertilisers are concerned, is summarised below.

There seems little doubt, says the report, that a major increase could be obtained in Colonial crop production by the wider use of fertilisers, organic and inorganic, on existing areas of cultivation. Nitrogenous fertilisers are in world short supply, and subject to allocation by the IEFC. World demand is at present running at about 130 per cent of world supply, and while allocation lasts, an increase in supplies to the Colonies could only be made at the expense of the United Kingdom and other Empire areas.

### Phosphate Deficiency

The low phosphate content of many of the soils in the tropical dependencies is widely known and it is one of the problems being tackled by the operators of the East African Groundnut Scheme. The use of phosphates is likely to be particularly important for the development of better pastures for Colonial livestock farming and for oilseeds and cereal crops in Africa. The extended use of phosphates in particular areas is dependent on their economic effectiveness rather than availability of supplies.

It would be of great value, suggests the report, if fertilisers could be economically worked in Colonial territories themselves, and it is to be hoped that the geological survey of the Colonies will pay particular regard to the needs of agriculture for fertilisers. If further technical reports are satisfactory, the newly discovered phosphate deposits at Tororo in Uganda should be fully exploited in order to serve the African cultivator as well as the operators of the East African Groundnut Scheme.

### Synthetic Nitrogenous Fertilisers

The committee has considered what steps might be taken to develop production of synthetic nitrogenous fertilisers in the Colonies themselves. The standard process is to synthesise ammonia, for which hydrogen is required, prepared either from coal or coke or, alternatively, by electrolysis of water. Where large and unfailing supplies of electric power are available at low cost, the process could be operated wholly on electric power. In addition, sulphur in some form was necessary for combining the ammonia to ammonium sulphate, but there were other end-products for which sulphur is not needed. Possibilities existed in Uganda in conjunction with the projected Owen Falls Hydro-Electric Station, in Rhodesia in connection with hydro-electric developments in the Zambesi Gorges, and in Borneo in connection with the possible development of hydro-electric power there.

### Organic Fertilisers

Preliminary consideration has also been given to the use of organic fertilisers. These were already much used in various territories both by estates and by peasant cultivators, observes the committee, but there is great room for improvement.

In conclusion, the committee considers there is an urgent need for research into the use of fertilisers in the Colonies, particularly Africa. It notes that fertiliser trials on a scientific plan have been started in the East African Colonies, and suggests that a similar scheme should be prepared in West Africa.

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## South African Wattle Bark

In a review of 1947 the South African Wattle Bark Millers' Association states that exports of extract totalled 79,300 tons (65,600 in 1946), but bark exports fell to 52,200 tons. The U.K. was the largest market for extract and the U.S.A. for bark. Because of the "trade war" between India and South Africa the Government of Madras had a plan for the development of an indigenous wattle bark industry. It was proposed to plant some 30,000 acres and to set up a research station there.

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## India's Chemical Industry

Dr. Alexander Findlay, former president of the Royal Institute of Chemistry of Great Britain, speaking at the Annamalai University in India recently, said that the country now possessed a great opportunity to develop its chemical industry. India's natural resources could be utilised in many ways by the application of modern methods of industrial treatment. Dr. Findlay was in India as a representative of the Royal Institute of Chemistry with a view to consulting Indian chemists regarding the formation of a professional organisation.

# POROUS MEDIA

## Definitive Study of Properties and Applications

RECOGNITION that the term "porous medium" is in general usage a highly inexact expression and that it makes occasionally a very incongruous appearance in otherwise impeccably exact expositions of scientific matters is paid in recent issues of *l'Ind. Chim.* in a series of articles by H. Braidy. In these articles are set out the accepted scientific definitions of varying degrees of porosity and the typical and other characteristics of materials endowed with that quality.

A porous medium is defined as a solid traversed by fine channels or passages, as implied in its etymology, and must be distinguished from alveolate structure, which is honeycombed or pitted with small cavities. It must be capable of being traversed by liquids when serving as a filter, and the diameter of its pores ranges roughly from 0.0001 to 200 mu. There may, further, be two subdivisions: (a) permitting the passage of fine precipitates and colloids, and (b) crystalloid solutions and gases.

The following are diameters in mu of various particles: red corpuscles of blood 7000, *B. anthrax* 700, small bacilli 100-1000, colloidal gold 20, oleic acid molecule 10, chloroform molecule 8, hydrogen molecule 0.2, hydrogen ion 0.08, electron 0.000003. There is, however, not necessarily a close relationship between diameter of pores and size of the particles passed: other factors than the dimensions of pores play an important part.

### Common Characteristics

In considering the characteristics of the porous state it is necessary to study structure, profile and diameter of channels, the number per unit volume, and their length. Uniform structure in natural porous substances is rare, but it can, of course, largely be controlled in artificial bodies, such as filter beds, adsorbents of textile cellulose, asbestos or other material, etc. Study of the mean diameter of pores is inevitably related to the laws of capillarity (Jurin) and of viscosity (Poiseuille) and of extrapolation. The number of pores naturally determines their volume, and this latter may be determined for any porous body by means of specific gravity calculations.

The length of the pores is often important and since generally the channels run in all directions it is usual to reckon length as a function of thickness of the mass. In the case of a flat substance with parallel faces its thickness would determine what is known as a relative pore length. The foregoing is by way of introduction, preliminary to the study of properties.

Building on these axioms, the author goes on to study specific properties. On pore fineness depend phenomena of flow of liquids, of which viscosity is one of the principal determinants, of diffusion, capillarity, and (in conjunction with the number of pores and nature of their surface) also adsorption, catalytic activity, surface action, electrolytic phenomena, etc.

### Liquids and Gases

Flow of liquids is measured in small diameter tubes as viscous or Poiseuille flow; but if the liquids are more rigid as emulsions viscosity laws may not apply. For hot or highly rarefied gases molecular motion is the decisive factor. Considering first the normal Poiseuille motion, equations are given from which are derived values for F (friction), A (coefficient of viscosity) and Poiseuille's general law both for a single tube and also in a porous mass of multiple tubes, *e.g.*, for a porous plate, as modified in the formulæ of Manegold, Bjerrum, Hoffmann and others. Tables are given respectively for viscosities of various liquids in poises at 20°C. according to E. Darmois, variations of water viscosity with temperature, and of air under varying conditions according to Brémond (*Chim. et Ind.*, 1915, *53*, 366+).

Reference is made to earlier works relating viscosity of liquids to distribution, form, and motion of molecules, such as that of Brillouin, Guzman, etc., and especially to the book on "The Liquid States of Matter," by Prof. E. Darmois (published by Albin Michel), and Boltzmann's formula with that of Guzman for return of a liquid to its original form after deformation based on the number of molecules involved at the contact surfaces.

Unlike liquids, the viscosity of gases increases with temperature and this at first sight paradoxical fact is explained by the intermingling of molecules as between different layers thus increasing friction which increases with rising temperature. Viscosity of gases as a function of absolute temperature T is given by Sutherland's equation $\eta\tau = A \frac{T^{1.5}}{T + C}$ where C is a constant which has been determined by Braitenbach for various gases.

If $\eta_0$ is viscosity at 0°C. 760 mm Hg, then A in the above equation $= \frac{273 + C}{273^{1.5}}$.

The value of C is for air 119.4°, carbon dioxide 239.7°, hydrogen 71.7°, nitrogen 113°, and oxygen 138°, while 273 is absolute temperature at 0°C. This relation has been confirmed by many experiments. (Brémond, *loc. cit.*)

### Viscosity

The viscosity of liquids and gases as a function of pressure is considered. Liquid viscosity increases with pressure, water being an exception under moderate pressures. Bridgman's experiments quoted by Darmois (*loc. cit.* p. 217) up to 12,000 kilos/cm.$^2$ have shown that, under this pressure volume itself is reduced by about 25 per cent in most cases, while viscosity is multiplied by 47 for ether, by 15.5 for carbon disulphide, and by 10 to 895 for alcohols according to the number of carbon atoms (the lower multiplier refers to methyl alcohol). Increased viscosity with pressure is due to molecular association. For gases the coefficient of viscosity is roughly independent of pressure and therefore of density at constant pressure, and this also is explained by molecular movement.

Certain anomalies in the Poiseuille regime are noted, including the special case of emulsions, of liquids in which frictional force is not proportional to rate of flow gradient, and of liquids under more or less permanent deformation, *i.e.*, rigidity. These latter have been particularly studied by Duclaux, and include colloidal solutions such as soaps, gums, rubber, etc.

### Molecular Flow

The second part of this chapter on flow relates to molecular flow to be observed only in gases, and includes a discussion of Knudsen's equation as confirmed by Clausing and Klose (*Ann. physik.*, 1909 (4), 28, 75; 1930 ((5), 7569; 1931 (5), 1173). From this it is deduced that viscosity plays no part, and that the volume flow measured under the same conditions of temperature and pressure varies inversely as the square root of molecular mass M (density).

This last is regarded as specially remarkable, since it means that molecular flow is selective for various gases in the case of a mixture, constituting a further departure from viscosity laws under which a liquid mixture flows *en bloc* without selectivity. But Knudsen's equation has serious limitations: it takes no account of adsorption and it does not apply at high temperatures. This has been shown, for example, by Brémond (*Comptes Rendus*, 1933, *196*, 1651) for carbon dioxide and sulphur dioxide, and the reasons explained including the possibility that, at high temperatures, the effective

(*Continued in next column*)

diameter of pores undergoes change. It is concluded practically that the flow of a gas remains much the same up to 250°, falls by 10-15 per cent between 200° and 300°, returns to its original rate at about 500°, and increases by 10-15 per cent at about 1000°.

(*To be continued*)

## New Chrome-base Concrete

### Supports Loads at High Temperatures

OFFICIALS of the refractories division of the U.S. plant of the Babcock & Wilcox Company have announced the development of a new high-strength chrome-base refractory concrete known as Kromecast which is said to be able to withstand temperatures as high as 3100°F. The new product is of importance for industrial furnaces because it makes available for the first time an easily installed concrete combining the refractory and slag-resisting properties of chrome-base materials with the ability to support loads at high temperatures.

### Slag Resisting Properties

The new concrete, which can be poured into place as easily as the ordinary grade, and applied by plastering or with a cement gun, retains volume stability up to the maximum temperature, at the same time providing protection against attack by fuel slags, metallurgical and chemical slags, molten materials and other reactive products.

While the refractory and slag-resisting properties of chrome ore have long been recognised, its installation in plastic form by ramming and pounding requires considerable time and labour and previously available chrome plastics, as well as concrete, had a tendency to slump if used in vertical walls without extensive support. Company officials say the new concrete can be used to construct vertical walls and roof arches in many types of furnaces that formerly had to be made of less resistant materials, principally in metal heating and forging furnaces. The new product can also be used in car tops, electric furnace roofs, water-cooled boiler furnaces operating at high temperatures, and many similar uses.

### Hydrochrome

A second product, Hydrochrome, also a chrome-base concrete, for use in furnaces where temperature and spalling conditions are not as severe has also been developed by the firm. Hydrochrome has a temperature use limit of 2800°F. and is recommended for water-cooled boiler furnaces and for metal processing furnaces with moderate operating temperatures.

# FLUORINE: A NEW FACTOR IN INDUSTRY—II

by W. BULL

WHILE, on the basis of raw material costs, the scope of fluorine in industry, from the present viewpoint, cannot be clearly defined, evidence—such as preparation and technical application of sulphur hexafluoride, the Freons, the unique stability and range of fluorocarbons, the specific high resistance of "Teflon" (a polytetrafluoroethylene polymer) to attack by boiling acids, organic solvents and its temperature stability to 300°C., the marked energy and catalytic properties of the elemental gas itself—indicates a rapidly widening field of utilisation in commercial technology and industry.

This proceeds from the recent relatively safe commercial-scale production and transportation of fluorine. At present, however, chief practical technological interest in the existing initial output and utilisation follows from the fact that apparatus for its adequate generation has during recent years been considerably developed and that increased current densities and means to diminish polarisation, while avoiding relatively high temperatures in production cells, are now well established. The design of big fluorine generating units has been improved to a degree which enables efficient and safe operative conditions, having regard to the nature of the electrolyte and the active properties of the gases.

To exemplify the results of specific investigation of permanent value to chemical engineering, brief references may be made to the all Pyrex apparatus for the isolation of fluorine. Similar principles of steam tetrachlorethylene distillation have been embodied in earlier designs of fluorine apparatus but, owing to their sensitivity to external temperature fluctuations, it has been difficult to secure the requisite precision in fluorine isolation. A constant-temperature apparatus evolved in the research laboratories of Magnolia Petroleum Company, by its low thermal conductivity, its practically automatic operation and repetitive capacity without changing $SO_4$ or frequent cleaning, enables precision results to be obtained in isolating fluorine. In isolating from sodium fluoride, for example, precise percentages can be ascertained within 30 minutes for each sample. The 250-watt steam generator is controlled by auto-transformer and the apparatus is heated by a 750 W. shallow-cone electric heater.

Earlier intensive joint research of a similar character, stimulated by demands of the U.S. authorities, has made relatively safe continuous production of elemental fluorine

**The U.S. operator in charge of this pilot scale generator is not unmindful of the special hazards associated with fluorine production. Fluorine and some of the materials used in its production are more dangerous than chlorine**

on an industrial scale by batteries of 250, 600, or 2000 amp. cells an integral part of modern chemical engineering. Some units of these plants have already operated more than 5 million amp. hours, producing some 7000 lb. of fluorine. The evolution of modern types of fluorine production units is particularly interesting as an example of a scientific progression. It has grown from research to applied work in the laboratory, which gave rise to radical modifications of pilot scale production, and thence to industrial practice serving a field ranging from production-engineering to pestology.

### Components

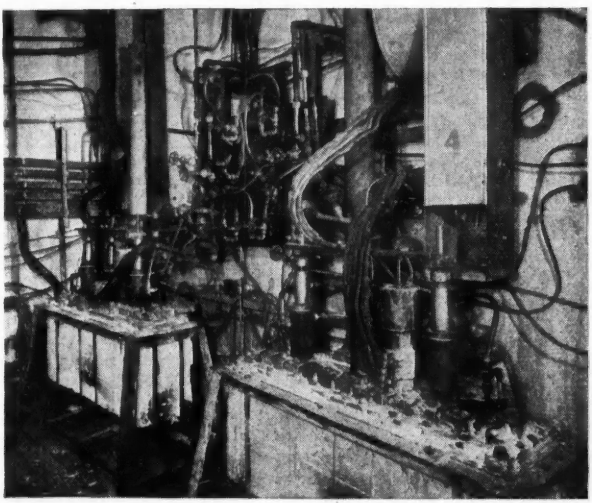
The commercial fluorine cell embodies four main assemblies:

(a) A steel casing, water or steam jacketed, in which the electrolyte composition is around KF-2HF at 100°C., permitting reasonably precise low temperature autocontrol, and an extensive use of welded carbon steel construction. This working temperature is dependent on the composition and freezing point of the electrolyte salt, *viz.*, KF 1.8-2.0 HF. The electrical conductivity of the electrolyte varies as the percentage of anhydrous hydrofluoric acid to potassium difluoride, the acid being a non-conductor. For control purposes, tables of specific conductivities and specific gravities have been made available by the Massachusetts Institute of Technology; an addition of up to 3 per cent lithium fluoride is advisable.

(b) The anode assembly. Here, although nickel has certain advantages, its use on an industrial scale is attended by relatively rapid dissolution and sludge formation; prepared carbon plates are now the more common means of fluorine isolation. The intimate attachment of these carbon plates to their conducting framework is essential. Such prepared plates in the Hooker 1000 amp. cell are 18 × 6.25 × 1.25 in., mounted in parallel rows of seven, each provided with a separate copper cover, so that individual replacement is facilitated. By immersion to 12 in., some 14 sq. ft. of anodic area is active. The Hooker 2000 amp cell, with two sets of electrodes, operates at 71.5 amps. per sq. ft. at 2000 amps. and 53.5 amps. at 1500 amps.

The anode array of the Harshaw 1000-amp. cell, of which types have operated continuously and efficiently over long periods, are copper impregnated ungraphitised carbon rods. The advantages here include improved attachment facilities, a factor of prime importance in design, with consequent enduring efficiency of electrical circuit, considerable resistance to fracture and, arising from this, a more pronounced insensitivity to changes in electrolyte HF concentrations.

These carbon rods are of 1.25 in. dia. and 12 in. length. Initial starting procedure is facilitated by inclusion of two nickel anodes in the anode array. Of practical interest was the observation of the Harshaw Company during its investigations into anode design that a graphite rod exposed to fluorine gas for 26 hours notably increased its dimensions, and its weight increased by 6 per cent. Correctly prepared



**An installation at the John Hopkins University, showing the heavily insulated electric leads, gas lines and valves. One poppet valve, it will be noticed, is sheathed by a sheet metal cover as a safeguard against splashing**

carbon anodes, in addition to being considerably less costly as processed carbons than nickel, the original standard anode material, are proving indispensable in large-scale output where the anodes must resist fracture and be safeguarded against the polarisation factor. In the Pennsylvania 250-amp. fluorine cell of 500 lb. electrolyte capacity, which seems to have been designed more especially for pilot-scale or preparatory work, the anode insulation is a specialised iron phosphate. An interchangeable nickel plate anode in conjunction with nitrogen sweeping of cell spaces is employed for the first eight hours of operation and is replaced by the carbon anode assembly for subsequent continuous generation to 250 amps. at around 9.0 volts, producing some 0.33 lb. of fluorine hourly.

The principle of securing a definite and intimate anode-to-conductor contact is demonstrated in the John Hopkins University anode design in which satisfactory results are achieved by recessing the copper anode bar at 0.003 in. less diameter, providing a drive fit for machined ends of carbon rods which carry axially screwed-in copper dowels 0.25 in. in diameter. The anode bars are 2 in. deep, the projecting ends of the axial copper dowels are silver soldered and the 0.75-in. diameter copper anode bar terminal risers carry Teflon insulating collars. Anode sections not in contact with fluorine are always subject to heavy corrosion deposits.

Cathodes satisfactory in operation are of sheet carbon steel and may be louvred or perforated to encourage circulation of electrolyte or to direct hydrogen away from the anode area. The cathode assembly should be supported separately by welded bolts passing through insulators in the cell cover. The cathode is usually box shaped.

### Separating Screen

The screen interposed between anode and cathode has a highly important function; its main purposes are to prevent mixture of the two gases, hydrogen and fluorine, and to prevent inception of nodal corroding areas it is important that the screen should be continuous. The Harshaw screen of later design, now proving highly efficient, is of 8-mesh Monel, silver-soldered into a channel recessed into upper steel section and end-jointed by a gas Monel-welded seam. Sufficient space must be allowed between cell interior walls and base to provide that screen or assemblies are not short-circuited by debris.

The electrolyte is potassium bifluoride to which vaporised hydrogen fluoride is introduced within the cell, interaction is rapid, and the temperature of the electrolyte is maintained by gas burners, steam or hot water jacketing. Nitrogen gas is used for sweeping cell spaces and to exclude air from the cell. All steel pipe lines and spaces require to be swept with nitrogen before starting generation, or on shutting down before opening the cells. Fluorine is allied but senior in aggressiveness to chlorine and its generation, handling and storage require both similar and specific precautions. Both electrolyte and hydrogen fluoride are dangerous, readily causing injury to human skin, while elemental fluorine is more dangerous in contact or by inhalation than chlorine. Fluorine will react with organic substances, occasionally violently, and its attack on grease or dirt within the pipe lines may result in conditions in which steel is progressively consumed. Rubber will react vigorously if slightly greasy, water vapour reacts explosively. Combustion effects and temperatures with elemental fluorine are exceedingly intense.

While many reactions of elemental fluorine are singularly aggressive, many of its relatively new industrial compounds are extraordinarily persistent in form, stable under powerful acids at boiling ranges, and can withstand relatively very high temperatures without chemical change. The fluorocarbons alone, for example, may afford a range of industrial and technological substances of strikingly different properties but probably greater in industrial scope than are the parallel industrial hydrocarbons.

*(Concluded)*

For much of the data in this survey the writer is indebted to the Research and Development Department of the Pennsylvania Salt Manufacturing Company, and Mr. A. L. Baker, vice-president of the Kellex Corporation and Prof. E. T. McBee of Purdue University; E.I. Pont De Nemours & Company; Mr. J. A. Pollard, supervisor of production research, Magnolia Petroleum Company; Mr. Robert D. Fowler, chairman, Department of Chemistry, the Johns Hopkins University, Baltimore; The Harshaw Chemical Company and the Hooker Electrochemical Company.

## Methylated Spirit Price Increase

A Board of Trade official announcement, which THE CHEMIAL AGE reproduced last week, stated that the price of industrial methylated spirit had been increased by 6½d. per gal. The increase is, in fact, 6d. per gal. This correction was circulated by the Board approximately one week after the original announcement had been issued—and after THE CHEMICAL AGE had gone to press.

# Frequency Distributions

## Chemical Engineering Procedure

A MEETING of the North-Western Branch of the Institution of Chemical Engineers was held at The College of Technology, Manchester, on March 20, when a paper, "The Value of Statistics to the Chemical Engineer," was presented by Mr. N. T. Gridgeman.

A brief description of the uses of statistics was followed by a discussion of frequency distributions. The mean deviation, it was noted, is rarely used because it is mathematically intractable. The standard deviation which is more commonly used, can be expressed as abscissal distances on a normal distribution curve.

### Standard Deviation

The normal distribution curve is an ideal which can be approached but never fully realised, while its use on small collections of values can lead to false conclusions. However, the theory has been adapted to small collections by the use of the sample value of the standard deviation. The relation between the sample value and probability is variable, and depends on the number of observations comprising the sample. The standard deviation also can be adapted to small groups of observations, and when expressed as a percentage is called the coefficient of variation.

The analysis is valuable in the investigation of sample fluctuations and in the planning of experiments. Its unit is variance which is the square of the standard deviation, and it has the valuable property of being additive. The variance ratios can be connected with the probability to give a quick assessment of significance. Statistically planned experiments interlock the variables as closely as possible, the Latin and Graeco-Latin squares being used. Correlation and regression which measure the degree and the kind of association respectively between two or more factors, are allied to the analysis of variance.

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## Simplified Analysis

The U.S. organisation, Jay and Jay Chemical Laboratories, of Kansas City, announces that Mr. A. G. Jackson, formerly chief chemist of the Kansas State Grain Inspection Department, has, as a result of more than two years' research, perfected a method of combining in convenient tablet form a balanced preparation of ingredients, including the catalyst, for the digestion process of the Kjeldahl nitrogen determination or protein analysis.

C

# U.S. Aluminium Technology

## Calcined Clay to Remove Iron

ELIMINATION of iron in the production of aluminium from clay by the ammonium sulphate process is dealt with in a report of investigations (R.I.4183) by the U.S. Bureau of Mines. In the usual process the clay is first baked with ammonium sulphate and then leached with circulating mother and wash liquors. A large part of the iron in the clay is extracted. Unless steps were taken to remove it it would tend to build up in the circulating liquors, making it increasingly difficult to produce aluminium of sufficiently low iron content.

Since most clays contain appreciable quantities of iron, and since iron is one of the most objectionable impurities in aluminium, the removal of iron is one of the most important problems in the process.

### Soluble Iron Precipitated

Of the various methods of removing iron that were investigated, the most satisfactory was the addition of calcined clay in the leaching step. This procedure involves no change in the regular leaching and crystallisation flow sheet and causes most of the soluble iron to be precipitated, probably as the compound $2NH_4.3Fe_2O_3.5SO_3$, thereby preventing build-up of iron in the circulating liquors. The iron precipitate is discarded with the leach residue. The treatment with calcined clay has no appreciable effect on the extraction of aluminium from the baked product, and little if any of the aluminium in the calcined clay is extracted. The report is furnished with ten tables illustrating the particular stages of the process.

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## U.S. SYNTHETIC RUBBER

U.S. synthetic rubber is to continue until 1950 to be the subject of Government production and control. This is the effect of a Bill which the U.S. Congress passed on April 1.

A Senate-House conference report on the Bill said it is the policy of the United States that there shall be maintained at all times in the interest of national security and common defence a technologically advanced and rapidly expandable rubber producing industry of sufficient capacity to assure availability in times of national emergency of adequate supplies.

The report also called for the development of a free competitive synthetic rubber industry, and the ending (if and when consistent with national security) of wartime controls over patents, production facilities and uses of synthetic rubber.

# American Chemical Notebook

*From Our New York Correspondent*

A SURVEY of the industrial chemical manufacturing industry in the New York City area just completed by Robert R. Behlow, regional director of the Bureau of Labour Statistics, United States Department of Labour, reveals that hourly earnings of class A chemical operators average $1.39, class B operators average $1.26. The rates prevailed during January, 1948, in 14 establishments in the area, are exclusive of overtime payments and wage variations for night shift workers. The following are the rates for a few of the key jobs surveyed; Chemical operators, Class A, $1.39; chemical operators, class B, $1.26; chemical operators' helpers, $1.06; laboratory assistants, $1.22; mixers, class B, $1.09; truckers, hand, $1.11; clerk-typists, female, $1.02; stenographers, class B, female, $1.13.

* * *

As one of the 20 mobilisation planning staff divisions, a chemicals, rubber and plastics unit which is expected to be in operation by this summer, will be set up by the National Security Resources Board, the agency established by Congress to advise on military, industrial and civilian preparedness. Only two appointments have so far been made—those of Mr. Arthur Wolf, wartime Navy strategic raw materials official, and former Food and Drug Administration research chemist, and Mr. Norman Shepherd, chemical director of the American Cyanamid Company, who has been appointed consultant on chemicals, rubber and plastics. Within the next few months it is expected that the chemical division will add at least two more staff members.

* * *

The United States Patent Office has granted patents No. 2,438,488 to Frank J. Anderson and Duncan R. Williams, of Laramie, Wyoming, assignors to the Monolith Portland Midwest Company, Laramie, covering a process whereby materials found in abundance in the earth's crust may be used to produce aluminium oxide suitable for use in the production of aluminium at lower cost and in greater quantities. Under the process developed by Anderson and Williams, kaolin, marl and related materials, including nearly all mineral and mixtures of minerals containing silicon, aluminium and calcium, such as the feldspars, particularly anorthosite, shales and clays, and impure bauxite may be converted to either aluminium oxide or Portland cement without preliminary purification By using the process to produce aluminium oxide and Portland cement simultaneously, both can be had at low cost, since the plant used in the manufacture of Portland cement can be operated by unskilled labour with little supervision. The process, according to the patent, may also be used to produce the oxides of beryllium, titanium, and vanadium as well as aluminium oxide, as these metals act just as aluminium does in the process, or it may be used on a raw material containing two or more of these metals, producing a mixture of aluminium and beryllium oxide.

* * *

The German Linde-Frankl method for the production of oxygen, hitherto used almost exclusively by the Elliott Company, Jeanette, Pennsylvania, manufacturers of power plant equipment, has now been discarded in favour of a new process which will permit large-scale output. It may make possible extended use of oxygen in steel mill open hearths, blast furnaces, Bessemer converters and electric furnaces to increase steel output. Another major application will make the U.S.A. less dependent on foreign supplies of liquid fuels by use in synthetic oil production. Commercial oxygen-making plants using the Elliott process, to be installed at costs in excess of $1 million will produce more than 25 million cu. ft. (or 1000 tons) per day. In the new process, preconditioned air is cooled to minus 300° F., and distilled in a special distillation column into its components of oxygen and nitrogen. The latter is valuable for ammonia or nitric acid production, while the oxygen can be piped directly to its point of use. Some of the advantages of the new process have been confirmed by a pilot plant, which in the course of two months' operation has disclosed that it can operate indefinitely without the necessity of periodic "defrosting" shutdowns, thus overcoming one of the big disadvantages of earlier processes. The method is also said to reduce explosion hazards.

* * *

According to the U.S. Department of Commerce, American production in January of ammonium nitrate, chlorine, hydrochloric acid and caustic soda was the highest on record, although output of synthetic ammonium sulphate, soda ash and sulphuric acid was slightly less than in December last year.

# POLISH CHEMICAL PRODUCTION AND PROSPECTS

## Good Progress in First Year of Economic Plan

ALTHOUGH, in 1947—the first year of Poland's economic plan—the production target of the chemical industry is stated to have been exceeded, the output of various industrial products was less than expected.

This—according to a statement circulated by the Polish Embassy—was especially true in regard to soda and sulphuric acid. The output of the latter fell short of the target owing to irregular supplies of pyrites, but the arrival of an important consignment in the third quarter of 1947 was reflected immediately in the rise in production. The total output of sulphuric acid was, however, only 73 per cent of the target fixed for the year.

Other products such as caustic soda, chlorinated lime, dyestuffs, oxygen, fertilisers and electrodes exceeded the pre-war figures.

### Developing Production

Capital investments in 1947 are stated to have been of a different character from those of the previous year. While, in 1946, the main object was to restart production in as many works as possible and to repair those which were damaged, in 1947 the main stress was laid on the development of those branches of production which were especially important for the national economy as a whole, the removal of bottlenecks and the building of new works. Of the total sum of 2460 million zlote (£6,150,000) earmarked for investments, the largest single item—606 million zlote (£1,515,000) was spent on building soda factories, 513 million zlote (£1,282,500) on fertiliser and sulphuric acid factories, 417 million zlote (£1,042,500) on coke factories, 260 million zlote (£650,000) on organic compound and drug factories, and 223 million zlote (£582,500) on rubber works. The rest was distributed among the other factories of the chemical industry. Moreover, in the fourth quarter of 1947, an additional credit of 550 million zlote (£1,375,000) was granted to fertilisers and organic compound factories.

Research work conducted in the laboratories of the industry, in conjunction with the Chemical Research Institute, is said to have helped to start 77 new branches of production, especially in the organic compound and drug industries.

The number of persons employed in the chemical industry at the end of December, 1947, was 45,500, as compared with 39,166 at the beginning of last year. The increase was 16 per cent, while the production increase in the same period was nearly three times as great (44 per cent). A considerable percentage of the workers was employed on capital investment and repairs.

Increased production is planned this year for sulphuric acid, crude soda, chlorine, bichromate, superphosphates, fertilisers, soap, varnishes and carbon electrodes.

Among factories producing inorganic products, the largest credits will be given to those making soda, in order to increase their output capacity by a further 35 per cent.

### Organic Chemicals

In organic chemical production, the largest credits will be granted for the reconstruction of two large factories—the State Synthetic Works at Dwory (£3 million) and "Rokita"—the Semi-Finished Organic Products Works (£1,375,000). These two concerns will be the main centres for organic chemicals. They will manufacture coal by-products and, it is hoped, produce considerable quantities of export goods. In 1948, "Rokita" will begin the output of a number of new articles, such as artificial tannins, plastics, resins and "anti-knock" additives, while "Dwory" will produce a number of raw materials in the acetylene group.

The output figures for the Polish chemical industry in 1947 are stated officially to have been :—

| | 1946 tons | 1947 tons | Percentage increase (1946=100) |
|---|---|---|---|
| Sulphuric acid ... | 31,968 | 47,662 | 149 |
| Crude soda ... ... | 116,267 | 141,244 | 121 |
| Caustic soda ... ... | 15,365 | 30,601 | 199 |
| Hydrochloric acid ... | 3,031 | 3,840 | 127 |
| Glauber's salt ... ... | 5,423 | 7,627 | 141 |
| Chlorinated lime ... | 1,558 | 3,540 | 227 |
| Potassium and sodium bichromates | 151 | 477 | 316 |
| Dyestuffs ... ... | 1,569 | 2,082 | 132 |
| Oxygen (1000 cu. m.) ... | 4,529 | 6,320 | 139 |
| Acetylene ... ... | 1,074 | 1,276 | 119 |
| Superphosphates ... | 159,050 | 182,976 | 115 |
| Potassium fertilisers ... | 99,189 | 120,812 | 122 |
| Saltpetre fertilisers ... | 37,061 | 67,400 | 182 |
| Ammonium nitrate ... | 6,129 | 8,477 | 138 |
| Soap ... ... ... | 4,255 | 7,054 | 166 |
| Glycerine ... ... | 53 | 117 | 221 |
| Varnishes ... ... | 1,191 | 2,690 | 226 |
| Ultramarine ... ... | 149 | 515 | 345 |
| Zinc oxide ... ... | 4,750 | 7,739 | 163 |
| Tar ... ... ... | 37,284 | 53,590 | 144 |
| Carbon electrodes ... | 4,688 | 5,360 | 114 |
| Tyres ... ... ... | 511 | 1,406 | 275 |
| Tubes ... ... ... | 62 | 217 | 350 |
| Footwear ... ... | 412 | 1,152 | 280 |
| Rubber soles ... ... | 1,090 | 1.996 | 183 |
| Conveyor belts ... ... | 341 | 993 | 291 |

# CANADIAN PRODUCTION & RESEARCH

CONSTRUCTION will be started soon on a new research laboratory for the joint use of the three Maritime Provinces of Canada as an aid to the development of industry. The laboratory, for which blueprints have already been drafted, will be located on the campus of Dalhousie University, Halifax, and the research station, to be known as the Maritime Regional Laboratory of the National Research Council, will be a two-storey structure of latest design to house 50 or more scientists. Approval by Parliament of an item in the estimates of the Department of Reconstruction is awaited before the work commences on the project, which will cost $150,000.

* * *

One thousand Canadian chemists and chemicals engineers will be in Montreal, June 6 to 10, for the annual conference and exhibition of the Chemical Institute of Canada. Among the delegates will be Dr. Arthur C. Cope, of the Massachusetts Institute of Technology, who will lead a discussion on general technical subjects and participate in the forum on organic chemistry. Conference headquarters and the exhibition, which will include more than 50 displays depicting the most recent advances in chemistry will be at the Mount Royal Hotel, Montreal, and following the conference delegates will visit Shawinigan Falls, Quebec, to see the immense hydro-electric and manufacturing developments in the St. Maurice Valley.

* * *

Full-scale production is expected to begin next month at the new salt plant near Edmonton built by the Alberta Salt Co., Ltd., which is a joint enterprise of Anglo-Canadian Oil Co., Ltd., Home Oil Co., Ltd., and Calgary and Edmonton Corporation, Ltd. The new plant, which cost $1 million, has a capacity of 150 tons per day and will manufacture salt products for both household and industrial use.

* * *

The Provincial Department of Natural Resources of Saskatchewan, Canada, is prepared to receive offers in connection with the commercial exploitation of certain potash discoveries, according to the American Consulate in Regina. It is understood that areas of Crown mineral lands up to 350,000 acres in extent have been proved by drilling to contain potash beds, and the Department is now ready to lease these areas to firms which desire to develop the deposits to production. The Provincial Department of Natural Resources, Regina, Saskatchewan, is seeking to negotiate long-term contracts, which will provide for a degree of State co-operation.

* * *

Four recovery plants in Saskatchewan between them produced during 1947 a record output of more than 162,000 tons of sodium sulphate. This exceeds the previous record (1942) by 31,000 tons. It has been estimated that by the end of 1948 paper mills in the United States and Canada will be using more than 800,000 tons of sodium sulphate annually, representing over 80 per cent of the total North American industrial consumption of this mineral.

Pointing out that practically all sodium sulphate produced in Canada came from Saskatchewan, Mr. J. Bichan, Saskatchewan Director of Mineral Resources, said the Government-owned plant at Chaplin was expected to begin operations shortly, and that its output would provide a substantial increase in total production in 1948.

## CANADIAN CHEMICAL CHARGES

ALLEGATIONS that the Liberal party in the province had established a "dummy" corporation, registered as Acme Dye & Chemicals, Ltd., which had sold products to the Government at specially high prices to obtain campaign funds, were made by the Premier, Mr. T. C. Douglas, in the Saskatchewan Legislature. The company, he alleged, had sold 20,000 lb. of dye to the Government between 1940 and 1942 at $5.80 a lb—$3.44 a lb. more than the Government was now paying.

Mr. A. T. Procter, Liberal member for Moosomin and former Minister of Highways, who was in charge of the provincial tax commission which made the purchases, described the allegations as "not only false but malicious lies told only for the purpose of obtaining political advantage."

**Canadian Atomic Energy Finance.**—Further expansion of Canada's atomic energy plant at Chalk River is visualised in the Dominion Government statistics tabled in the Canadian House of Commons. An increase of $223,000 over last year's vote of $5.73 million has been provided for construction purposes and operating expenses. Reductions have occurred, however, in administration expenses of the Atomic Energy Control Board ($37,000), and research ($7500), the total estimates for these two items being $77,000 and $142,000 respectively.

# A CHEMIST'S BOOKSHELF

**Organic Analytical Reagents.** F. J. Welcher. (New York: D. Van Nostrand Company, Inc.). London: Macmillan and Co., Ltd. Vol. I, Pp. xv + 442. £2 4s. 0d.; Vol. II, Pp. xi + 530. £2 0s. 0d.

By the production of this impressive work, Prof. Welcher has done analytical chemists a service the extent of which can be indicated at present only by comparison. One can try to visualise the position of the organic chemist without Beilstein. Naturally, the organic field is much vaster nowadays, but it is probably not extravagant to suggest that in future years Welcher may, to the analytical chemist, be an equally familiar name.

Organic analytical reagents suggest, in a stricter sense than that used here, organic reagents used to produce compounds for gravimetric, volumetric or colorimetric analyses, as precipitants, complexing agents and the like. The genesis of this type of analytical work may be dated, with some uncertainty, shortly before the opening of the present century, though dimethylglyoxime, first used in 1904, is often quoted incorrectly as the earliest example of such a reagent. Since 1900 the number of reagents which must be included, even in the narrowest view, has been so extended that often only the merest chance will bring an analytical chemist, even one of wide knowledge and experience, into touch with the reagent which precisely suits his problem.

There are useful textbooks which list many of these reagents, with more or less detail as to their use. Often a passing reference in one of these books proves more baffling than helpful, since it hints at something of which no details can readily be traced. Often, again, the analytical worker has an idea, but has not the time necessary for the literature search which would be involved in determining whether the idea is novel, or whether it has already been proved worthless.

Consequently, the time has now arrived for a stocktaking of all these reagents, and Prof. Welcher has ably attacked this formidable task. Judging only from these two volumes (the first, it is believed, of a series of five) there seems to be little further that could justifiably be asked of the author. In Volume I there are five extremely useful introductory chapters which present a summary of aspects of the modern theory of valency which have a bearing on the application of analytical reagents. A brief historical approach in these chapters leads up to a discussion of the different classes of compounds which can be formed between inorganic and organic materials.

From that point onwards, different species of organic compounds are dealt with by chapters, Volume I containing sections on hydrocarbons, substitution products of hydrocarbons, alcohols, phenols, phenolic compounds, aminophenols, phenolsulphuric acids, 8-hydroxyquinoline and its derivatives, azo-derivatives of 8-hydroxyquinoline, ethers, aldehydes and ketones.

Volume II deals with the organic acids, halogen substituted acids, hydroxy acids, amino acids, miscellaneous acids, acyl halides, acid anhydrides, esters, amines, and quaternary ammonium compounds.

The title of the book has been interpreted in its widest sense, so that miscellaneous uses in analytical processes have been included. Thus such functions as the extraction of a precipitate (as exemplified by the extraction of bromine and iodine by carbon tetrachloride), or the alteration of ion activity (as by the addition of acetone in the test for cobalt by thiocyanate), find a place.

In most instances, particularly those where the reagent is at all unusual, methods of preparation are given. These will be particularly valuable, since the use of a reagent is often prohibited by its absence from the laboratory shelves. In general, the formula, molecular weight, synonymous names, Beilstein reference and a brief resumé of the general properties of each reagent are also included. In addition, references to the literature are generally made in such a way as to indicate the precise contents of the original papers. This is a most useful practice, and one that might well be widely copied.

Possibly no better way of indicating the inclusive scope of the work can be found than to list the applications described for three reagents, two common and one uncommon.

*Chloroform.* General analytical uses: Detection and determination of bromine and iodine; Detection and determination of copper: Detection and determination of zinc:

(*Continued overleaf*)

Determination of beryllium and aluminium: Determination of iron: Determination of zirconium: Determination of cobalt: Detection of rhenium: Detection of antimony: Detection and determination of molybdenum: Determination of indium: Determination of nitrate: Determination of magnesium: Determination of silver and chloride: 25 references.

*Ethyl alcohol.* General analytical uses: Separation and determination of potassium (as perchlorate or chloroplatinate—five procedures): Determination of sodium: Separation of lithium from sodium and potassium: Separation of sodium, potassium and barium: Determination of magnesium and calcium: Separation of calcium from strontium and barium: Separation of calcium and magnesium: Separation of calcium and strontium: Separation of barium from strontium and calcium: Determination of lead: Detection of cobalt and bismuth: Detection of mercury: Determination of chromium: Detection and determination of boron: Determination of copper: Determination of silver: Determination of iron: Separation of carbonate-free sodium hydroxide: Titration of acetic acid: 77 references.

5, 7 - *Dibromo* - 8 - *hydroxyquinoline.* Preparation (from 8-hydroxyquinoline): Separation and determination of copper, titanium, iron and aluminium (four procedures): Determination of iron: Detection of copper, titanium and iron: Determination of lead: Detection of vanadium: Determination of zirconium: Determination of cobalt: Separation and determination of gallium: 20 references.

In all, about 150 reagents are covered in Volume I, and 200 in Volume II. The reviewer is convinced that all analytical chemists will await the remaining volumes of this valuable work with an impatience equal to his own, not only for the valuable information which they will render readily available, but at least equally for the stimulating ideas for future investigations which will crowd on the reader at almost every page.

While it would be impossible for such a work to be completely free from errors and omissions, these, and in particular the latter, are, as far as can be judged by close scrutiny and random trial, very few. An index of the names of the organic reagents (including synonyms) and one classifying the uses of the reagents, render it a simple matter to find any particular piece of information. It is probably unnecessary to add that the production and appearance of the books are worthy of the contents.

Now that the appearance of Prof. Welcher's work has shown how effectively it can be done, analytical chemists will probably not rest completely content until someone does as adequately for two other fields what Prof. Welcher has done for his—these are the expanses of organic analytical reagents for organic analysis, and general inorganic analytical reagents.—C.L.W.

(*Continued in adjoining column*)

# Brewing Research

## Far-reaching Programme Initiated

FOR many years the Institute of Brewing has maintained its research staff on an extra-mural basis in the Department of Brewing and Industrial Fermentation of the University of Birmingham, in the College of Technology at Manchester, and formerly at Rothamsted Experimental Station. The brewing industry, through the medium of the Brewers' Society, has recently made provision for the annual expenditure of a large sum on research, and has entrusted the expenditure to the Institute of Brewing. The Council of the Institute has now adopted an extensive scheme of reconstruction under which its research activities will be centralised in an establishment, which it is proposed to form in the neighbourhood of London, for the study of the sciences applicable to brewing and fermentation. Existing co-operation will be maintained with associated research organisations and there will be close contact with scientific and technical societies, and other research organisations and centres.

Sir Ian Heilbron, D.S.O., D.Sc., LL.D., F.R.S., Professor of Organic Chemistry in the Imperial College of Science and Technology, has recently been appointed director of research.

## INDUSTRIAL SAFETY CONFERENCE

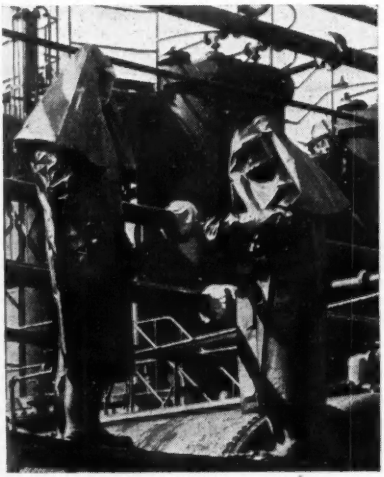
ONE of the speakers at the National Industrial Safety Conference to be held in June at the Royal Hotel, Scarborough, will be Mr. A. Webster, of the Association of British Chemical Manufacturers, who will present a paper on "Chemical Hazards in Non-Chemical Works." Arranged by the Royal Society for the Prevention of Accidents, the conference, which opens on Thursday, June 10 and continues until June 13, will be attended by safety officers, industrial experts and delegates from firms throughout the country. Speakers on the opening night will include Lord Llewellin, the president of the society, Mr. G. P. Barnett, H.M. Chief Inspector of Factories, and Mr. Ian Mikardo, M.P. The conference is open to all, whether members of the society or not. Particulars can be obtained from the society's Industrial Safety Division, 131 Sloane Street, S.W.1.

# Technical Publications

DWINDLING supplies of petroleum led chemists to produce petroleum products synthetically by the use of coal or natural gas as the raw materials. Among the processes generally accepted as practicable, the Fischer-Tropsch (Hydrocol, or Synthol) process was originally handicapped by being uneconomic, but, nevertheless, was persevered with in Germany during the war. Certain comparatively recent modifications and improvements largely attributable to U.S. chemists, have reduced costs and brought the process closer to perfection. A publication with a direct bearing on the subject has now been written by B. H. Weil and J. C. Lane, and is obtainable from Remsen Press Division, Chemical Publishing Co., Inc., New York (300 pp., $6.75). Its title: "Synthetic Petroleum from the Synthine Process."

* * *

A list of 1400 current British Standards prepared by representative committees of 50 different industries is contained in the 1947 Yearbook of the British Standards Institution. A comprehensive index facilitates accessibility. Copies are obtainable from the offices of the Institution, 24 Victoria Street, S.W.1 (3s. 6d.)



**Complete suits of "Neoprene" protective clothing worn by workmen at an acid plant. Even at high temperatures, HCl and $H_2SO_4$ in concentrations up to 30 per cent cause no serious deterioration, while higher concentrations react slowly. The effect of alkalis is similar**

The Federation of British Industries Register of British Manufacturers, 1947-48, has just been published jointly by Kelly's Directories, Ltd., and Iliffe & Sons, Ltd. This is the first post-war edition and lists some 5000 firms under headings covering 5250 classes of products and services. Over 60 per cent of the edition of 10,200 has been earmarked for export and here there will be sufficient copies only for FBI members.

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Scientific data dealing with the physical properties of smelters' aluminium casting alloys are contained in the "Manual of Aluminium Casting Alloys," published by the Aluminium Research Institute, Chicago. It is a book in which design engineers, foundrymen and industry generally will find much useful information on the mechanical and physical properties of smelters' aluminium alloys, the general effects of alloying and the characteristics of each type of alloy. The general requirements regarding foundry practice and the effects of heat treating are concisely discussed. Profusely illustrated and containing many charts, diagrams and tables, the manual will be of great interest to metallurgical engineers and others.

* * *

"The Nickel Bulletin," published by the Mond Nickel Co., Ltd., celebrated its jubilee with the January, 1948, number—its 21st. It was an opportune occasion to review the service which the journal has rendered to industry by way of assisting engineers and designers to take the best advantage of the properties offered by the many nickel-containing materials available. Of great value as a reference source for the whole metal industry, the Bulletin contains abstracts of current published information on nickel and its alloys, including electrodeposition and other coating methods, nonferrous alloys, nickel-iron alloys, and patents. For the convenience of readers, a separate list gives addresses and publishers of periodicals, and transactions.

* * *

Latrobe Electric Steel Company, Latrobe, Pa., has published a new pocket catalogue of working data on high-speed steels and tool and die steels. The 80-page catalogue which contains many unusual features for practical shop use, condenses description and heat treatment and application data on all the most widely-used varieties. Classifications include high speed, nondeforming, oil hardening, hot work, shock and chisel, die casting, water hardening and carbon steels. Data on each grade of steel is presented on two facing pages

# PERSONAL

MR. WILLIAM DOWNS, JR., has resigned from the board of Bairds & Scottish Steel Co., Ltd.

MR. B. W. H. YOULTEN has been appointed public relations officer to the British Road Federation.

MR. J. NICHOLSON has retired from the board of the Distillers Co., Ltd., after nearly 50 years' service with the company.

MR. J. A. MARTINO has been appointed a director of Goodlass Wall & Lead Industries, Ltd., in succession to MR. F. W. ROCKWELL, resigned.

MR. J. WILLIAMS, former Mayor of Widnes, and retired chemical works manager, was returned on April 1 for East Ward, Frodsham, in a Runcorn Rural Council by-election.

SIR BASIL A. KEMBALL-COOK, K.C.M.G., C.B., Divisional Food Officer, London, has resigned, and MR. LACHLAN MACLEAN, C.B., O.B.E., has consented to undertake the duties as from May 1.

DR. GILBERT W. ROBINSON, professor of Agricultural Chemistry at the University College of North Wales, has been elected to a Fellowship of the Royal Society for his contributions to the study of soils.

MR. D. G. SOPWITH has been appointed superintendent of the engineering division of the National Physical Laboratory, DSIR, filling the vacancy caused by the appointment of DR. G. R. HANKINS, as director of mechanical engineering research.

MR. DANIEL S. DINSMOOR, a former vice-president of Monsanto Chemical Co., St. Louis, U.S.A., who from 1932-34 was in this country to assist in technical and administrative assignments on behalf of that company, has been appointed director of development of the American Potash and Chemical Corporation with headquarters at the Los Angeles office.

Three workmen of Darwins, Ltd., steel manufacturers, of Sheffield, are to share in the direction of the company. The men—MR. GEORGE BARLOW, MR. WILLIAM MARTIN, and MR. THOMAS GORMLEY—will serve with three managerial representatives on the Darwin Advisory Board, which functions as a regulating body for the Darwin group of companies.

MR. VICTOR WARREN, head of Hunter & Warren, Ltd., Glasgow explosive merchants, has been appointed sales manager (explosives and mining) to Imperial Chemical Industries, Ltd., in Scotland, with headquarters at Blythswood Square, Glasgow. This appointment follows the acquisition of the firm by I.C.I., Ltd. Hunter & Warren, Ltd., have been in the explosives industry for the last 50 years and have a very considerable connection with users in Great Britain.

The British Export Trade Research Organisation announces that, in order to provide a specialist service for its members engaged in the chemical export trade, it

**Dr. M. A. Phillips**

has retained as technical adviser DR. M. A. PHILLIPS, who was, until recently, assistant chief chemist with May & Baker. In 1937 he was responsible, with Dr. A. J. Ewins, for the introduction of the famous M. & B. 693.

DR. CHARLES F. BONILLA, a leading specialist in high pressure reactions in the field of chemical engineering, has been appointed Professor of Chemical Engineering at Columbia University's School of Engineering. At present Professor of Chemical Engineering at John Hopkins University, Baltimore, Dr. Bonilla will direct research and teach in the field of chemical engineering thermodynamics. He graduated at Cuenca Institute in Spain. As a consultant, Dr. Bonilla has been associated with Chesapeake Chemical Co., the Maine Salvage Equipment Co., the Phillips Petroleum Co., and the U.S. Board of Economic Warfare.

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**Trans-Atlantic 'Phone Facilities.**—The Post Office announces that the telephone services with Costa Rica, Honduras, Nicaragua and Panama have been re-opened. A three-minutes call to any of those countries will cost £3 15s. 0d.

# Home News Items

**Monsanto Choir.**—A choir from the Monsanto Chemical Works, Cefn Mawr, conducted by Mr. L. Newton Wright, has entered for the mixed choral at Llangollen International Eisteddfod.

**Continuous Penicillin Production.**—Penicillin production at the Barnard Castle works of Glaxo Laboratories, Ltd., continued during the Easter holidays, thus saving millions of doses of penicillin (worth thousands of pounds) that would otherwise have been lost.

**Coke Exports.**—With the loading of 1500 tons of graded coke in the steamer *Margol* at Liverpool this week, the Liverpool Gas Co. provided coke for export for the first time since the war. The shipment, which is destined for Sweden, is the first of a series to be made to that country and Finland.

**Dividend Ceiling—Monsanto Agrees.**—Monsanto Chemicals, Ltd., has informed the Federation of British Industries that it is willing to adhere in principle to the Federation's dividend ceiling request (last year's total payments, just reported, amounted to 5 per cent, less tax).

**Chemical Workers' Savings.** — Savings groups in chemical concerns employing 500 or more people invested £321,309 in National Savings during the quarter ending December last, including £146,332 saved through voluntary deductions from pay. Figures just issued by the National Savings Committee also show that average savings per savings group member in these organisations for the same period were £5 15s. 3d. compared with £3 11s. 4d. for the last quarter of 1946.

**Plan For Monopolies.**—In a publication entitled, "Survey of Legislation," issued by the Conservative Party Central Office last week, the formation of a Restrictive Practices Commission to deal with monopolies is suggested. Members would include men with business, legal, trade union and economic experience and the commission would decide whether a monopoly or restrictive practice was harmful to the public. If so, the Government would be asked to find a remedy.

**Scottish Shark Oil.**—The rapid progress made last year in shark oil processing on the West Coast of Scotland has led to the formation of a second company, which will operate a converted herring drifter using Campbeltown as a base. The technique of catching and processing basking sharks, which are plentiful off the west coast during the summer months, has been perfected over the past two years and the oil and glandular products command a ready market.

**Rock Sulphur Ignites.**—Firemen, climbing on four railway wagons loaded with rock sulphur which was ablaze at Trafford Park Sidings, Manchester, last week, shovelled the burning substance into the roadway and averted a more serious conflagration.

**Brymbo Steel Works Fatality.**—While oiling a ladle carriage used for carrying molten metal at Brymbo Steel Works, Trevor Griffiths, aged 63, on April 1, received head and leg injuries and died later in Wrexham hospital.

**High Rayon Output.**—Rayon output in February at 18.8 million lb., says *The Board of Trade Journal*, was 4 per cent lower than in January. On a daily basis, however, it was 2½ per cent above the January rate and equal to the record rate reached last October.

**Aid For Students.**—To keep British textile students in touch with modern developments in the industry, the Textile Institute is this year offering special places for students at its annual conference at Buxton in June. Conference fees, accommodation costs and travelling expenses, to a maximum of £10 each will be allowed to successful applicants.

**Oil Fire Outbreak.**—Prompt action by the fire brigade and the Liverpool Fire Service prevented the spreading of a fire early on April 2 in a 3000-gal. tank of quenching oil at the English Electric and Napier's Works, East Lancashire Road, Liverpool. About 30 large north windows in the roof were broken, and a quantity of oil was destroyed.

**Hydraulic Pit Props.**—The formation, by the Dowty Equipment Company, of a £25,000 subsidiary to manufacture hydraulic steel pit props has been announced. The new prop, a direct-line descendent of the hydraulic undercarriage used on British bombing planes, is operated like a motor jack and can be adapted to fit any coal face. By means of a special safety device, miners are warned when pressure on the prop is too great.

**£70,000 Fire Damage.**—Firemen wearing breathing apparatus were driven back by blazing crude rubber in the basement of a three-storey warehouse in Comus Street, off Regent Road, Salford, belonging to the Greengate and Irwell Rubber Company, on April 3. The interior of the store soon crumbled, and little but a brick shell was left. Besides large quantities of rubber in the building there were many thousands of yards of textile material used for the making of belting. Damage is estimated at £70,000.

# Next Week's Events

SATURDAY, APRIL 10

**North of England Institute of Mining and Mechanical Engineers.** Lecture Theatre of the Institute, Newcastle-upon-Tyne, 2.30 p.m. General meeting. Dr. W. Taylor: "The Firing Characteristics of Low Tension Electric Detonators."

MONDAY, APRIL 12

**Royal Institute of Chemistry.** (Hull and District Section). Royal Station Hotel, Hull, 7 p.m. U. R. Evans: "The Electrochemical Mechanism of Corrosion."

**Institution of the Rubber Industry.** (Midland Section). James Watt Memorial Institute, Great Charles Street, Birmingham, 3, 7.15 p.m. E. F. Powell: "Demonstrations with Rubber."

TUESDAY, APRIL 13

**Society of Chemical Industry.** (Plastics Group). Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 6.30 p.m. H. Jones and E. Chadwick: "Temperature Sensitivity of the System Plasticiser/Polymer."

**Society of Instrument Technology.** College of Technology, Manchester, 7.15 p.m. H. Schmitt: "Automatic Control Applications in the Chemical Industry."

WEDNESDAY, APRIL 14

**Society of Chemical Industry.** (Liverpool Section). Queen Hotel, Chester, 7 p.m. H. Wilkinson: "Absorption of Fat from the Intestines."

**Royal Institute of Chemistry.** (Sheffield, S. Yorks and N. Midlands Section). 2.30 p.m. Visit to Wood Bros. Glass Works, Barnsley. Barnsley Mining and Technical College, 6 p.m. Prof. H. Moore: Lecture.

**Institute of Petroleum.** Manson House, 26 Portland Place, W.1, 5.30 p.m. S. T. Minchin: "Properties of Paraffin Wax as an Effect of Composition."

**Northampton Polytechnic.** St. John Street, London, E.C.1, 7 p.m. Dr. R. F. Phillips: "Newer Engineering Materials—Plastics."

**British Association of Chemists.** (London Section). Gas Industries House, Room 3, 1 Grosvenor Place, S.W.1, 7 p.m. H. C. Young: "British Rubber in Chemical Engineering."

THURSDAY, APRIL 15

**Society of Chemical Industry.** (Road and Building Materials Group). Gas Industry House, 1 Grosvenor Place, S.W.1, 6.30 p.m. Fourteenth Annual General Meeting. K. E. Clare: "The Waterproofing of Soils with Resinous Materials."

**Royal Institute of Chemistry.** (Liverpool and Northwestern Section). Chemistry Lecture Theatre, University of Liverpool, 7 p.m. Annual General Meeting. Dr. T. Malkin: "X-ray Study of Glyceride Polymorphism."

**Institution of Mining and Metallurgy.** Rooms of the Geological Society, Burlington House, Piccadilly, W.1, 4.15 p.m. General meeting.

THURSDAY, APRIL 15 and FRIDAY, APRIL 16

**Electrodepositors Technical Society.** The Imperial Hotel, Temple Street, Birmingham. Annual Conference. Thursday: 2 p.m. H. C. Clements, W. H. Sawyer and L. Mable: "Automatic and Manual Polishing Methods, Machines and Technique." 7.30 p.m. Conference dinner, Friday: 2.15 p.m. A. Smart and H. Silman: "Developments in American Plating Process." 7 p.m. Post Conference Social Evening.

**Royal Institute of Chemistry.** Birmingham. Annual General Meeting.

FRIDAY, APRIL 16

**Institution of Chemical Engineers.** Connaught Rooms, Great Queen Street, W.C.2, 11.45 a.m. Twenty-sixth annual corporate meeting. 2.30 p.m. H. W. Cremer: "The Chemical Engineer and Civilisation."

**Institution of the Rubber Industry.** (Leicester Section). Bell Hotel, Humberstone Gate, Leicester, 7 p.m. Annual General Meeting. Dr. H. J. Stern and F. N. Pickett: "The Past, Present and Future of Rubber."

**British Interplanetary Society.** Lecture Theatre, Science Museum, South Kensington, S.W.7, 7 p.m. V. W. Slater and W. S. Wood: "High Strength Hydrogen Peroxide for Rocket Propulsion."

**Royal Institution of Great Britain.** 21 Albemarle Street, W.1, 9 p.m. E. V. Evans: "The Gas Industry."

SATURDAY, APRIL 17

**Institution of Chemical Engineers.** Caxton Hall, Westminster, 7.30 p.m. Dance.

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**Export Promotion—Changed Address.**—The Export Promotion Department of the Board of Trade has removed (with effect from April 3) from 35 Old Queen Street, S.W.1, to Thames House, North Millbank, S.W.1.

# AUSTRALIAN CHEMICAL DEVELOPMENT

## Growing Importance in Economic Affairs

AUSTRALIA'S progress towards industrial maturity has been greatly accelerated by the needs of war and the growth of new and expanding industries, fulfilling home and export requirements during peace. The various phases of development have been determined by the nature and distribution of indigenous raw materials, power resources, labour supplies, transport facilities, available capital, and tariff protection in certain industries.

These are among the general conclusions reached in an authoritative survey which has now been issued by official sources.

Playing an important part in the development of a balanced economy for the country is the chemical industry.

The new products made in Australia as a result of wartime developments include chromium chemicals for plating, colour-making and other uses, acetone, butyl alcohol, amyl alcohol and other solvents; nitrobenzine; acetic acid, aniline, trichlorethylene, citric and tartaric acid, cream of tartar, phthalic anhydride, beta naphthol synthetic resins for paint manufacture, ammonia, and ammonium chloride. There has been a marked expansion in the production of a wide range of other industrial chemicals such as nitric acid, phosphorous, sodium bicarbonate, phosphate and various other sodium salts. Examples are fertilisers, such as sulphate of ammonia of which 29,160 tons were produced in 1946-47, and superphosphate of which 384,200 tons were produced in 1946-47.

### New Pharmaceutical Industry

Striking advances were also made during the war in the production of drugs and pharmaceutical chemicals required to maintain the health of the Services and the civilian population, mainly under the direction of the Medical Equipment Control Committee and with the help of the Council for Scientific and Industrial Research.

Synthetic vitamins for the fortification of such foods as margarine, and as a substitute for cod liver oil were also required. The curtailment of overseas supplies of essential drugs led to the substitution of local products such as morphine obtained from opium poppies, digitalis from the foxglove plant, and hyoscine and atropine from the duboisia tree. Pharmaceutical preparations manufactured since 1939 include the group of sulpha drugs, penicillin, insulin, caffeine and many others, for some of which, in particular the sulpha drugs, there is an overseas demand.

The significance of Australia's self-sufficiency in both coal and iron ore, the essential bases of heavy industry, cannot be over-estimated, particularly as Australia is the major source of both minerals in the Western Pacific area. Though richly endowed with coal, Australia's supplies of iron ore are not so considerable.

Estimates of the total national reserves vary between 200 and 990 million tons, and even the highest estimates do not place her among the world's ten leading producers. In 1938 (the latest date for which figures are available) the total production of iron ore was 2,280,491 tons, of which approximately 168,000 tons were exported.

### Schemes for Self-Sufficiency

Australia is almost entirely dependent on imported petroleum despite constant and strenuous efforts by the major oil companies and the State governments to find flow oil. The production of shale oil, a comparatively costly operation, was subsidised by both the Commonwealth and New South Wales governments in the Newnes district, where deposits yielding over 100 gallons of oil to the ton occur. Production of power alcohol from wheat was begun during the war, but abandoned after the failure of the wheat crop in 1944-45.

The aluminium industry in recent years has shown significant development, and progress has been made in the mining of bauxite, in which Australia is now self-sufficient. There are large bauxite deposits in New South Wales, Queensland, and small quantities in Tasmania.

Australia's deficiency in organic chemicals has been the subject of an investigation undertaken by the Division of Industrial Chemistry. This has led to the erection of a potassium fertiliser plant, the planned capacity of which has been designed to make the country self-sufficient in this commodity. The wide range of organic and inorganic chemicals and biological products developed since 1939 includes ethylene from alcohol and furfural from waste agricultural products for use in plastics and related industries, waxes from waste, organic acids and organic chemicals from tar oil. Other projects include that of a Canadian firm to set up alumina and electrolytic refining plants, and a British scheme to produce cuprammonium and acetate filaments.

# Overseas News Items

**French Fertiliser for Austria.**—The French Superphosphate Company is to supply Austria with 15,000 tons of superphosphate fertiliser by the end of May.

**Austrian Nitrogen Production.** — The Austrian Nitrogen Works is now in full production, turning out quantities of nitrates sufficient for the manufacture of 16,600 tons of chemical fertilisers per month.

**Uranium in Canada.**—Uranium ore has been discovered within 30 miles of the town of Flin Flon, Manitoba, Canada, on about 18 claims held jointly by two citizens of the town.

**French Aluminium Production Up.**—Improved power supplies in France have resulted in a higher aluminium output during February, provisionally estimated at 3540 tons, as compared with 2583 tons in January.

**German Chemists To Visit Milan Fair.**—The Milan Fair (April 29 to May 16), the most important Italian industrial fair, is to be attended this year by representatives of the German chemical, iron, steel and optical industries.

**French Oil Refineries More Active.**—Although operating on less than three-quarters of production capacity, French pétroleum refineries last year produced 5,090,000 metric tons, compared with 2,853,000 tons in 1946.

**Hungarian Pharmaceuticals.**—The Alkaloid Chemical Works, Hungary, is preparing to produce during the current year 4000 kg. of morphine. It is proposed to sell over 3000 kg. in foreign markets. Other important pharmaceutical products to be manufactured include antropine, theobromine, papaverine and scopolamine.

**Argentina's Trade With Holland.**—Chemicals and tin from the Netherlands East Indies are among the commodities to be shipped by Holland to Argentina under a new five-year trade agreement signed in Buenos Aires recently. In addition to grain, Holland will purchase casein and quebracho extract.

**U.S. Credit for Egyptian Fertilisers.**—Egyptian Fertiliser and Chemical Industries, Ltd., Cairo, has been granted a credit of $5.6 million (at 3½ per cent) by the Washington Export-Import Bank. The money is to be used for the purchase of equipment and U.S. engineers' services required for the construction, near Suez, of a plant for the manufacture of nitrogenous fertilisers. The total cost of the plant is estimated at about $20 million.

**Czech Copper Mining.**—Operations were resumed last autumn in the old copper workings at Banska Bystrica in Central Slovakia, where smelter has also been restarted.

**Uranium in Mozambique.**—Six uranium and three asbestos deposits have been found in the Tete district of Mozambique. This follows the recent discovery of several gold and silver deposits in the island.

**More Norwegian Whale Oil.**—When the whaling season ended on March 31, the nine Norwegian floating factories had produced nearly 950,000 barrels of whale oil, or slightly more than last year.

**Swedish Iron-Ore for U.S.A.**—Swedish industrialists are discussing iron ore exports to the U.S.A. against American payment in advance. The project is intended to commence at the same time as the Marshall Plan is realised.

**U.S. Lead Price Up.**—The St. Joseph Lead Co., St. Louis, and the American Smelting and Refining Co. were reported this week to have raised the price of common lead by 2½c. per lb. to the record levels of 17.30c., and 17.50c. per lb.

**Equipment Exchanged for Oil.**—According to a recently concluded agreement between the Italian Fiat group and the Sovrompetrol company (the Soviet Russian Rumanian Oil Company), Italian oilfield and refinery equipment is to be exchanged for Rumanian oil products.

**More Nationalisation in Hungary.**—A second nationalisation plan, affecting industrial, mining and metallurgical enterprises each with over 100 workers, is taking effect in Hungary. Some 20 chemical establishments and 68 iron and metal working firms have been nationalised.

**Italian Window Glass Production.**—The price of window glass in Italy has decreased considerably in recent weeks. In some cases the reduction averages 6 lire per square foot. One of the principal reasons for the fall in price is that the building industry is virtually at a standstill.

**Swiss Chemicals for Denmark.**—The recently concluded trade agreement between Switzerland and Denmark envisages the export of the following Swiss chemical and allied products (parenthesis figures are values in million Danish crowns) during the current year: chemicals for the textile and leather industries (1.25), insecticides (0.35), pharmaceutical intermediates (1.5), finished pharmaceutical products (0.5), various chemicals (0.5), dyestuffs (5.0).

# Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

## Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CARLTON CHROME, LTD. (Notts.), metallurgists. (M., 10/4/48.) March 4, £5295 13s. 8d. debenture, to T. Booth, Carlton (Notts.); general charge.

MECHANISM, LTD., Croydon, scientific instrument makers. (M., 10/4/48.) March 4, debenture to Barclays Bank Ltd., securing all moneys due or to become due to the Bank; general charge.

JAMES H. RANDALL & SON, LTD., London, W., metal workers. (M., 10/4/48.) March 3, £10,000 mortgage to Westbourne Park Building Society; charged on properties. *Nil. September 12, 1947.

NICKEL & CHROME PRODUCTS, LTD., Pudsey. (M., 10/4/48.) February 26, mortgage to Midland Bank Ltd., securing all moneys due or to become due to the Bank; charged on plot of land and 16 Crimbles, Pudsey, with machinery, fixtures, etc.

CARBIDE STORES, LTD., London, W.C., manufacturers of carbides. (M., 10/4/48.) March 5, debenture, to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; charged on all properties at Greenwich and Manchester, and a general charge. *Nil. November 11, 1947.

KUALA PERGAU RUBBER PLANTATIONS, LTD., London, E.C. (M., 10/4/48.) March 6, charge, to Industrial Rehabilitation Finance Board securing all sums which the chargee may be called upon to pay under or by reason of a certain guarantee; charged on land known as Kuala Pergau and Balah Estates (Malaya). *Nil. December 11, 1947.

LANKRO CHEMICALS, LTD., Eccles. (M., 10/4/48.) March 5, mortgage and charge to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land, offices, works, laboratories, etc., known as Bentcliffe Works, Salters Lane, Eccles, together with machinery, fixtures, etc., also a general charge. *Nil. October 6, 1947.

## Satisfaction

BAIRD & TATLOCK (LONDON), LTD., laboratory furnishers. (M.S., 10/4/48.) Satisfaction March 9, of debentures registered May 24, 1932, to the extent of £4500.

# Company News

The name of **B. Laporte, Ltd.**, Kingsway, Luton, has been changed to **Laporte Chemicals, Ltd.**, as from March 10, 1948.

The name of **Knights Oil and Chemical Co., Ltd.**, Church Road, Perry Barr, Birmingham, 22B, has been changed to **Knights (Mfg. Chemists), Ltd.**, as from March 3, 1948.

The nominal capital of **Seamus, Ltd.**, fertiliser manufacturers, etc., Cambridge Works, Coldharbour Road, Bristol, 6, has been increased beyond the registered capital of £3000, by £2000 in £1 shares.

The nominal capital of **Gaye Products, Ltd.**, chemical manufacturers, etc., 140 Piccadilly, London, W.1, has been increased beyond the registered capital of £100, by £9900, in £1 ordinary shares.

The nominal capital of **W. J. Bush & Co., Ltd.**, manufacturing chemists, etc., 28 Ash Grove, Hackney, E.8, has been increased beyond the registered capital of £375,000, by £375,000, in £1 5 per cent non-redeemable cumulative preference shares.

**Manganese Bronze & Brass Co., Ltd.** proposes to pay a final ordinary dividend of 20 per cent on May 21 for the year ended December 31, 1947, as against 22½ per cent in 1946. Net profit (less tax) amounted to £173,277, compared with £127,977 in 1946.

**Monsanto Chemicals, Ltd.** has announced a trading profit of £706,273 for the year ended December 31, 1947, compared with £875,268 for 1946. A final dividend of 30 per cent (less tax) has been recommended on the ordinary stock, making a total of 45 per cent (less tax) for the year (1946, 40 per cent, tax free).

**Bowmans (Chemicals), Ltd.**, chemical manufacturers to the tanning trade, lactic acid makers, etc., has applied to the London and Liverpool Stock Exchanges for permission to deal in 75,000 5½ per cent redeemable cumulative preference shares, all of which were placed at a price of 21s. each to the company. The proceeds of the new preference shares are to be used mainly for financing the programme of extensions at the works. The book value of the company's assets covers over 1½ times the nominal amount of 75,000 5½ per cent shares.

# Chemical and Allied Stocks and Shares

HELPED by the certainty of Marshall aid and the removal of Budget uncertainties which had been overhanging the market, industrial shares have been more active and higher on balance, although best levels were not held. British Funds steadied after the

reaction which followed terms of British Electricity stock and the discount established in the price of the latter. Buying of industrials centred mainly on shares of companies which are playing an important part in the export market, and whose earnings are well in excess of last year's rate of dividend.

Imperial Chemical rallied to 49s. 6d. partly on general expectations that the 10 per cent distribution will be maintained. Moreover, the private placing at par of £1 million new preference £1 shares of British Titan Products has emphasised the important paint and kindred interests of the I.C.I. group. Ordinary capital of British Titan Products is owned by Imperial Chemical, Goodlass Wall, Imperial Smelting group and R. W. Greeff & Co. Fisons have changed hands around 61s., Greeff Chemicals Holdings 5s. shares were up to 16s. on close, and elsewhere, B. Laporte 5s. units were 21s. 9d. Among recent newcomers to the Stock Exchange, Albright & Wilson 5s. ordinary (issued at 28s.) rose further to 30s., and Amber Chemical 2s. ordinary were 10s. 3d. Paint shares rose on balance with Lewis Berger £8 on the important link-up made by the company's South African subsidiary. International Paint were £7¾, and Goodlass Wall 10s. shares 36s. 6d.

British Aluminium had risen to 47s. at the time of writing, United Molasses to 51s. 6d., British Oxygen to 99s. 4½d., while Monsanto Chemical, following their recent set-back, firmed up to 58s. 1½d. Imperial Smelting have been 22s. 3d. with Amalgamated Metal shares 19s. 9d., and Lever & Unilever 52s. 9d.

Iron and steels have been quite well maintained at the time of writing. Dorman Long being 30s. 10½d., with United Steel 29s. 3d., Colvilles 30s. 3d., Guest Keen 47s. 9d., while Tube Investments strengthened to £6⅜. Results of Vickers and Cammell Laird helped sentiment, although in some quarters it was suggested that the big transfers made to these companies from reserves of their steel subsidiaries may be a precautionary measure against the threat of steel nationalisation, Courtaulds at 41s. 6d. participated in the better tendency in leading industrials earlier in the week. British Celanese were 23s. 3d. Bradford Dyers 23s., and Calico Printers 20s. 7½d. In other directions, Associated Cement were 71s., with British Plaster Board 25s. 3d. Shares of plastics companies have been firm following news of the £1,160,000 developments planned by Bakelite, Ltd., which is expected to become a public concern by next June, although the shares may not be introduced to the Stock Exchange until the big plans now projected by the company have been completed.

Boots Drug have been steady at 54s. 3d., Beechams deferred were 22s., Sangers 32s. 3d., and Griffiths Hughes 35s. 6d. In other directions, British Glues & Chemicals 4s. ordinary were 21s. 3d. Blythe Colour 4s. shares changed hands around 60s. Oils became more active with Shell 78s. 9d., and Anglo-Iranian £8⅛, while Trinidad Leaseholds rose to 33s. 6d. on the company's deal regarding the U.K. market. C. C. Wakefield rose further to 79s. 4½d. There is continuing talk of the end of "Pool" petrol in June and a return to branded products.

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# British Chemical Prices

## Market Reports

LITTLE change in the general trading conditions has been recorded during the past week and all sections of the industrial chemicals market have continued steady, with prices displaying a firm undertone. Buying for home account has been fully sustained and a fair volume of new inquiries for export has been manifest. Among the potash and soda products the demand on the whole is greater than the quantities on offer, and much the same can be said of the other sections. The coal-tar products market resumed full activity and deliveries against contracts are proceeding steadily. Pitch, creosote oil and cresylic acid are in steady request for shipment.

MANCHESTER.—Reasonably brisk trading conditions have been reported in most sections of the Manchester chemical market during the week. Deliveries of the principal alkali products to the using trades in Lancashire have been on steady lines and good supplies of most other materials are being called for against orders already placed. New bookings have been of fair extent, so far as the home market is concerned, while shippers have again been prominent with offers of additional business for export, chiefly to the Dominion markets. There is a brisk seasonal demand for fertilisers and supplies are being fully absorbed as they become available. Most classes of tar products are meeting with a good inquiry.

GLASGOW.—In the Scottish chemical market business has been very quiet during the past week, chiefly as a result of the Easter holidays. There has been a noticeable reduction in the buying of chemicals by laundries. Otherwise there has been no substantial change in home market conditions. In the export market inquiries have continued on an average scale and a few orders have again been received. Considerable difficulty is still being experienced in securing import licences.

# Ceylon's Salt Industry

## Big Developments in Prospect

THE possibility of establishing a major industry in Ceylon with sea water as the starting material is engaging the attention of the Government, and Mr. E. B. Tisseverasinghe, Ceylon's Salt Commissioner, has already submitted a comprehensive report to the Minister for Industrial Research and Fisheries.

Mr. Tisseverasinghe is of the opinion that the extraction of salt from sea water should soon be one of the major industries in the island for many reasons, the chief of which is that there is a very good market for salt in neighbouring countries like Bengal, Burma, Malaya and even China and Japan. He asserts that the conditions for the production of salt in those countries are not as favourable as in Ceylon.

There should also be a good market in America for magnesia, if that could be produced cheaply and sold at a lower price than the prices ruling in the U.S.A. In order to increase the production of plaster of paris and chalk, a modern plant has now been installed at the Palavi saltern in North Ceylon.

At the Elephant Pass saltern, also in North Ceylon, a modern vacuum evaporation plant is being installed to produce boiled salt equal in quality to the finest grade of table salt. The plant is capable of producing about 6000 lb. of salt a day and is expected to commence work next month.

In the meantime, experiments are being conducted at the two model salterns at Elephant Pass and Palavi and at the laboratory at the Fisheries Research Station in Colombo, in the manufacture of magnesia, potash, caustic soda, iodine, boric acid and dry ice.

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# U.S. SULPHUR PRODUCTION

NATIVE sulphur production in the U.S. last January was 22 per cent greater than in January, 1947, according to the American Bureau of Mines. Shipments from the mines were considerably lower than in previous months and production was slightly in excess of sales. Stocks increased by 2388 long tons.

Production and stock figures (in long tons) for selected periods 1947-8, were as follows: January, 1948—production 391,214; stocks, 3,373,422. January, 1947—production 321,415; stocks 3,704,059. December, 1947—production 389,014; stocks 3,371,034. Monthly average production in 1947—370,101.

# German Oil Deposits

## "Largest on the Continent"

EXPLORATORY work carried out last year in the Emsland area of North-Western Germany has proved the existence of one of the largest occurrences of petroleum in the Continent of Europe, claims a German petroleum expert, Prof. Alfred Bentz. In the course of preliminary negotiations for a peace treaty with Germany, it is significant that the Netherlands Government has made a claim for the cession of the Emsland.

Test drillings are reported to be in progress for the purpose of ascertaining the extent to which these occurrences spread into Germany. An agreement is said to have been concluded between the Royal Dutch-Shell Group—which is exploiting the adjoining Dutch oil occurrences—and the German oil and mining group Wintershall A.G., laying down demarcation areas to be exploited by each company.

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# POLAND MAKES ANHYDROUS ALCOHOL

THE first Polish factory for the production of anhydrous alcohol went into production at the Chelmza sugar factory on March 11. In accordance with the Three-Year Plan the anhydrous alcohol works—state the Polish authorities in London—has been built in 16 months, in record time. The premises are built of ferro-concrete and are supplied with all modern equipment for the treatment of molasses up to the final stage. All the equipment was made in Poland.

The boiler tanks have been constructed of welded scrap iron which has considerably lowered the cost of the installation. The works will be able to produce 1500 litres of alcohol per hour—some 5 million litres yearly using 16,000 tons of molasses.

In order to utilise the molasses as fully as possible further development has been planned—provision for the refining of potash compounds from used charcoal.

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**German Potash Exports.**—During the 12 months period to March 31, 1948, approximately 32,000 tons of potash were exported from the bi-zonal area of Germany. Recipient countries were Czechosolvakia, Belgium, U.S.A., and the United Kingdom.—Mr. Mayhew.

**Austrian Oil Output Drops.**—Press reports from Austria estimate last year's oil production at 65,000 metric tons, a decrease of eight per cent on the 1946 figures.

# Patent Processes in Chemical Industry

**The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.**

## Complete Specifications Open to Public Inspection

Manufacture and use of resinous anion-exchanger products.—Soc. L'Auxiliaire des Chemins de fer et de L'Industrie. July 27, 1946. 28970/46.

Process for the production of high-value titanium dioxide pigments.—Spolek pro Chemickou A. Hutni Vyrobu, Narodni Podnik. Feb. 26, 1942. 35342/47.

Process for the production of titanium compounds which are free from or poor in iron.—Spolek pro Chemickou A. Hutni Vyrobu, Narodni Podnik. June 8, 1942. 35343/47.

Process for obtaining an exceedingly fine pulverisation.—J. L. P. de Z. Adan. July 31, 1946. 29046/1947.

Production of beryllium fluoride.—Aluminum Co. of America. April 24, 1943. 3644/1948.

Production of beryllium fluoride.—Aluminum Co. of America. April 24, 1943. 3645/1948.

Preparation of tertiary amino alcohols.—American Cyanamid Co. Aug. 20, 1946. 29270-72/1947.

Stabilised hydrocarbon composition.—Anglamol, Ltd. March 6, 1939. 3364/1948.

Stabilised liquid hydrocarbon.—Anglamol, Ltd. March 30, 1939. 3365/1948.

Lubricating composition. Anglamol, Ltd. Oct. 4, 1939. 3366/1948.

Corrosion inhibitor.—Anglamol, Ltd. Oct. 14, 1939. 3367/1948.

Lubricant.—Anglamol, Ltd. July 18, 1940. 3368/1948.

Lubricant.—Anglamol, Ltd. Nov. 25, 1940. 3369/1948.

Lubricant.—Anglamol, Ltd. July 28, 1941. 3370/1948.

Lubricating composition.—Anglamol, Ltd. Oct. 25, 1941. 3371/1948.

Stabilising agents for hydrocarbon compositions, etc.—Anglamol, Ltd. May 26, 1941. 3372/1948.

Lubricating composition.—Anglamol, Ltd. Oct. 27, 1941. 3373/1948.

Lubricating composition.—Anglamol, Ltd. Dec. 29, 1941. 3374/1948.

Lubricating composition.—Anglamol, Ltd. July 1, 1942. 3375/1948.

Lubricant.—Anglamol, Ltd. March 18, 1943. 3376/1948.

Lubricant.—Anglamol, Ltd. July 12, 1944. 3377/1948.

Lubricant improving agent and lubricant containing same.—Anglamol, Ltd. Jan. 31, 1944. 3378/1948.

Lubricants.—Anglamol, Ltd. Oct. 18, 1941. 4248/1948.

Production of silicon steel sheet stock having the property of high surface resistivity. Armco International Corporation. June 27, 1941. 4335/1948.

Production of silicon steel sheet stock having the property of high surface resistivity.—Armco International Corporation. Oct. 3, 1945. 4336/1948.

Manufacture of stable synthetic resins.—Beck, Koller & Co. (England), Ltd. Aug. 23, 1946. 3445/1948.

Process for producing dihydric alcohol modified melamine formaldehyde condensation products.—Beck, Koller & Co. (England), Ltd. Aug. 27, 1941. 3447/1948.

Process for the manufacture of urethanes.—Beck, Koller & Co. (England), Ltd. Aug. 29, 1939. 3448/1948.

Process for producing urea-formaldehyde resins.—Beck, Koller & Co. (England), Ltd. Oct. 27, 1944. 4187/1948.

Process for the manufacture of synthetic resins for stabilising textiles.—Beck, Koller & Co. (England), Ltd. June 17, 1944. 4188/1948.

Process for the preparation and application of reactive phenolaldehyde resins.—Beck, Koller & Co. (England), Ltd. Dec. 6, 1944. 4189/1948.

Conditioning of phthalocyanine dyestuffs to the pigmentary form.—L. Berger & Sons, Ltd. March 1, 1941. 3510/1948.

Manufacture of dyes.—British Celanese, Ltd. Aug. 21, 1946. 22278/1947.

Production of alcohols from olefins.—Compagnie Française de Raffinage. Aug. 23, 1946. 25090/1947.

Colour photography.—E.I. Du Pont de Nemours & Co. Aug. 21, 1946. 22986/1947

Developing agents.—E.I. Du Pont de Nemours & Co. Aug. 21 ,1946. 22987/1947.

New Oxazoles.—E.I. Du Pont de Nemours & Co. Aug. 21, 1946. 22988/1947.

Production of aromatic aldehydes.—E.I. Du Pont de Nemours & Co. Aug. 22, 1946. 23325/1947.

Insolubilisation of polyvinyl alcohol.—E.I. Du Pont de Nemours & Co. Aug. 22, 1946. 23326/1947.

Process of reducing cuprous oxide coatings to produce patterns or designs, and baths for use in the process. Kansas City Testing Laboratory. Aug. 24, 1946. 22741/1947.

Diagnostic compositions.—Miles Laboratories, Inc. July 3, 1940. 4075/1948.

Methods of and apparatus for treating textile fibres.—Monsanto Chemical Co. July 22, 1946. 17012/1947.

Processes of preparing carbamyl chlorides and isocyanic acid esters and the compounds resulting from said processes. Monsanto Chemical Co. June 25, 1945. 4006/1948.

Treating iron salt solutions.—National Carbon Co., Inc. Jan. 7, 1944. 4214/1948.

Production of blown fatty materials.—Nopco Chemical Co. May 11, 1940. 4093/1948.

Amides and their sulphonated derivatives. Nopco Chemical Co. Aug. 14, 1941. 4223/1948.

Treatment of hydrocarbon materials.—Phillips Petroleum Co. June 16, 1941. 3864/1948.

Furfural purification method.—Phillips Petroleum Co. Sept. 28, 1942. 3865/1948.

Furfural purification.—Phillips Petroleum Co. Feb. 15, 1943. 3866/1948.

Method of polymerising an unsaturated organic compound and product thereof.—Phillips Petroleum Co. Jan. 17, 1946. 4013/1948.

Method of treating potash material, etc.—Potash Co. of America. July 26, 1945. 4298/1948.

Process of steel making in open-hearth furnaces.—Soc. l'Air Liquide, Soc. Anon. Pour l'Etude et l'Exploitation des Procedes G. Claude.—Aug. 21, 1946. 23033-34/1947.

Ignition device for oxygen piercing and cutting lances.—Soc. l'Air Liquide, Soc. Anon. Pour l'Etude et l'Exploitation des Procedes G. Claude. Aug. 2, 1946. 28385/1947.

Process of activating the formation of chlorine dioxide in chlorite solutions.—Solvay & Cie. Aug. 22, 1946. 21667-68/1947.

Gyroscopic instruments.—Sperry Gyroscope Co., Inc. March 25, 1943. 18644/1944.

Lead alloys.—Telefon A/B L. M. Ericsson. July 12, 1946. 33161/1947.

Process for the production of chloral.—Westvaco Chlorine Products Corporation. Aug. 10, 1945. 4053/1948.

Method of producing starch esters.—N.V. W. A. Scholten's A/F. Dec. 12, 1938. 599,066.

Method for concentrating latex by means of creaming agents or with the aid of a centrifuge.—De Centrale Vereeniging Tot Beheer Van Proefstations Voor de Overjarige Cultures in Nederlandisch-Indie, and J. W. Van Dalfsen. Feb. 21, 1941. 599,006.

Electrolytic treatment of aluminium, and the like.—British Aluminium Co., Ltd., and A. N. D. Pullen. Sept. 28, 1943. 599,188.

Process for the catalytic isomerisation of saturated aliphatic hydrocarbons. Texaco Development Corporation. Jan. 15, 1943. 598,949.

Sulphur recovery.—M. J. Udy. Jan. 15, 1944. 599,073.

Apparatus for the quantitative determination of alkali, and alkaline earth metals in fluids.—American Cyanamid Co. July 19, 1943. 599,190.

Fuels for compression-ignition engines.—C. Arnold. (Standard Oil Development Co.) Aug. 8, 1944. 599,132.

Catalytic isomerisation of paraffins.—J. C. Arnold. (Standard Oil Development Co.) Sept. 6, 1944. 598,952.

Chlorinated products of fatty acids.—Ridbo Laboratories, Inc. Feb. 4, 1944. 599,133.

Aromatic amine N-pentosides.—Hoffmann-La Roche, Inc. Sept. 30, 1943. 599,013.

Production of pentoses.—Hoffmann-La Roche, Inc. Sept. 30, 1943. 599,014.

Preparation of triacyl pentoses.—Hoffmann-La Roche, Inc. Sept. 30, 1943. 599,015.

Production of ribityl-aminobenzenes and triacy derivatives thereof.—Hoffmann-La Roche, Inc. Sept. 30, 1943. 599,016.

Electrolytic reduction of organic compounds.—Hoffmann-La Roche, Inc. Feb. 17, 1944. 599,140.

Containers.—American Cyanamid Co. Sept. 8, 1944. 598,956.

Synthesis of imidazolidone compounds.—Hoffmann-La Roche, Inc. April 29, 1944. 598,957.

Substituted quinolines and methods of preparing them.—E. Lilly & Co. April 1, 1944. 599,141.

# CLASSIFIED ADVERTISEMENTS

## EDUCATIONAL



## SITUATIONS VACANT

*None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.*

ANGLO-Iranian Oil Company require an oil accountant for their headquarters in London. Applicants should be 30/40 years of age, and have had a good scientific or mathematical training. Degree or professional qualifications desirable but not essential. The work involves the preparation of statistics and production estimates for the operation side of refineries. Experience in this type of work would be an advantage. Salary according to age, qualifications and experience, etc. Applicants should reply quoting Department H.656 to Box 5167 at 191, Gresham House, E.C.2.

ASSISTANT Chemists required by old-established firm developing new processes for the manufacture of synthetic organics chemicals at their new works in the Midlands. Excellent opportunities are offered for young men of drive and ability. Experience in gas analytical work and a knowledge of manufacture of synthetic organic chemicals desirable but not essential. Salary, £350-£450 per annum. Apply in confidence, giving full particulars of qualifications and experience, to Box No. 2628, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMICAL Engineer wanted as Manager for chemical works in the Midlands. Position offers first-class opportunities and carries commensurate salary. Applicants must have good broad experience of manufacture of chemicals and be capable of planning extensions and taking full charge. Write, giving details of experience, age and indication of salary required. Box No. 2632, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

## SITUATIONS VACANT

CHEMIST required for Roan Antelope Copper Mines Limited, Northern Rhodesia. Qualifictaion B.Sc. in chemistry. Starting salary £450 p.a. if inexperienced, £510 p.a. if applicant has one year's experience, plus pension, bonus and cost of living privileges, and subject to two half-yearly increments at £30 p.a. to £510 p.a. and £570 p.a. respectively. Official application form from ROAN ANTELOPE COPPER MINES LIMITED, Selection Trust Building, Mason's Avenue, London, E.C.2.

CHEMISTS.—Non-ferrous metal refiners require additional Chemists for shift work. Preferably some experience in metallurgical analysis. West Bromwich district. Please apply to Box No. 2637, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PETROLEUM Company has vacancy in London for man, preferably with Agricultural Chemistry Degree, age 25-30 years. Good Prospects. Pension Fund rights. Write Box ZB 735, Deacons Advertising, 36, Leadenhall St., E.C.3.

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